

Garden
Guide

GARDEN GUIDE



THE AMATEUR
GARDENERS
HANDBOOK

DE LA MAR
GARDEN
BOOK

GARDEN GUIDE

The Amateur Gardeners' Handbook

Tells you how to raise Flowers, Fruits and Vegetables, How to Plan, Plant and Maintain the Home Grounds, the Suburban Garden, the City Plot, the Summer Vacation Garden.

How to Care for Roses and Other Favorite Flowers, Hardy Plants, Trees, Shrubs, Lawns, Porch Plants, Window Box Plants and House Plants.

How to Make a Rock Garden, a Water Garden and a Wild Flower Garden.

With Chapters on Pruning, Propagation, Transplanting, Fertilizers, Diseases, Insect Pests, Weeds, Tools, Greenhouses and Conservatories, Garden Frames.

Winter Storage, Canning and Preserving, Birds and Bird House Building, Goldfish in the Garden Pool, Animal Life in the Garden, Garden Furniture.

and a

Calendar of Garden Operations for the Northern and Middle States, for the Central, Upper and Lower South and for California

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Profusely illustrated with 300 reproductions from photographs, diagrams and teaching plans

By

TWENTY-EIGHT EXPERTS, EACH AN AUTHORITY ON THE
SUBJECT PRESENTED

Edited by A. T. DE LA MARE AND STAFF

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NEW YORK
A. T. DE LA MARE COMPANY, INC.

SIXTH EDITION, REWRITTEN AND GREATLY ENLARGED, MARCH, 1934

FIRST EDITION
Copyright, March, 1917

SECOND EDITION
Copyright, May, 1917

THIRD EDITION, Revised and Enlarged
Copyright, March, 1918

FOURTH EDITION, Revised and Enlarged
Copyright, March, 1920
Second Printing, November, 1921
Third Printing, January, 1923
Fourth Printing, May, 1925

FIFTH EDITION, Revised
Copyright, July, 1928
Second Printing, February, 1930
Third Printing, March, 1932
Fourth Printing, January, 1933

SIXTH EDITION, Rewritten and Greatly Enlarged
Copyright, March, 1934
Second Printing, May, 1935

A. T. DE LA MARE CO. INC. New York

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PUBLISHER'S FOREWORD

This Foreword appeared in the first edition of the Garden Guide, which was published in 1917 and consisted of 256 pages, and, on account of its appeal, has been republished in every edition since then.

A BOOK must bear a title, a distinguishing name, and so here we have the *GARDEN GUIDE*, a Handbook for the Amateur Gardener. Its scope will be unfolded in the Introduction of its editors and compilers. The publishers, however, ask a first hearing. The conception of the book was not at all limited to the purpose indicated by its title. It had a higher aim. Through its medium we hope to win thousands from crowded city homes to the free air of the open country. We seek to preach freedom from the very housetops, to induce worthy citizens to cultivate their health as well as their gardens and, in so doing, add to their happiness and the years of their lives, to do their duty by their children through environing their young lives with the surroundings which will make them sturdy, self-reliant and observant, and best fit them for their own battle of life. Fundamentally, there is no excuse for weaklings among those raised in the country and the out-of-doors.

The country (and in this term may be included practically all our suburban towns, boroughs and villages) is the children's paradise, with all Nature's world as their playground.

The hygienic value of fresh vegetables and fruits is beyond question; their value to the family cannot be estimated in terms of money. The writer knows this and thousands of fortunate suburbanites will testify to its truth. A good garden is Nature's antidote for all ills flesh is heir to; it certainly does not make for a source of revenue to the physician. Fruits and vegetables, each in their season, taken from your garden, cannot be surpassed for their freshness, flavor, and tenderness. Nearly every vegetable is an annual and can be grown with the first year's occupancy, the second Summer the taste for all the small fruits can be indulged in to the full and almost before you realize it the young fruit trees you set out are in bearing.

The Cliff Apartment dweller, whose vision is bounded on all sides by straight lines of brick and mortar, cement and stone, whose life is harried by the janitor, whose quietude is disturbed by the noises overhead and below, who cannot enjoy a night's sleep in the open without fear of arrest, whose movements to and from business are made miserable in trolley, subway or "L," must surely envy the commuter, even

though the latter be still made the butt of the irrepressible joker, whom we pardon because, poor man, *he* knows no better.

Advocacy of social advantages has no particular part in this presentation, yet these features have more play in country than in towns, for the acquaintances made by your children in the former will be more permanent and have a larger bearing on their future because they are more intimately brought together in their school, their play and their daily association.

Suburban public schools are governed to a great extent by men who have come out from the cities. Their advantages are equal to those of the city, perhaps superior, because the classes average smaller; high schools abound, and the education of the youth up to the age of seventeen or eighteen can thus be obtained near home.

Life in the suburbs opens the way to a family home—one's very own, eliminating forever the yearly move. Don't pay rent—own your home so you can do with it as you please. Permanence of location is helpful to well-being, so then make a careful selection. Take time to make an intelligent choice and, where you settle, make the best of it—stick. If you have the funds to pay for the home outright you are among the fortunate ones, otherwise the local building and loan association will take care of you at no greater outlay than rent if you own the ground and are considered a good moral risk. Inside of eleven years the home is yours and the money which would otherwise have gone to a generally indifferent landlord may be applied to betterments, to education or to the purchase of more land.

Whether it is better to buy than to build depends on circumstances. Painstaking investigation is always in order.

The family home, the home for your children and quite likely for some of your children's children, the home wherein the family traditions will linger, surely that is the home that's wanted—the home to which your children may return, and the recollection of which will brighten the toilsome days they may be forced to spend away from it. The family home is the wisest of all investments; it is the foundation which makes for family honor and stability. Pedigree adds to the stability of our country and its institutions, and the family home is the source and foundation of true patriotism.

There is no Springtime in the city, no Autumn. Among the bricks and stone the unfolding glories of Spring are unknown to the toiler and

his family. The city is equally unresponsive to the awakening life of the one as it is to the passing glories of the other. A city knows but two seasons, Summer and Winter; the reviving Spring and glorious Autumn are both unknown.

Do not let it be said of you: "The city was his country; he loved better to hear the trolley car rattle than the birds carol." The city may be a good place to work in; it undoubtedly is; but if all our homes could be in the freedom of the country we would be a superior race.

A. T. D.

INTRODUCTION TO FIRST EDITION

WE all have our dream gardens in which stretches of smooth lawns appear, with hedges of sweet smelling shrubs like Brier Roses, Lavender, Rosemary, or of neat-leaved Box, such as one sees at the old home of George Washington at Mt. Vernon. We have our scenes of Rose beds encircled by grass or sand covered paths, with a little fountain and bird bath nearby, a cosy arbor or rest house off to one side, borders filled opulently with a variety of old time hardy flowers, fragrant with memories of other days. Here and there a fruit tree stands laden with the promise of luscious fruits, and all around is the busy hum of insect life, with the flutter of birds and butterflies, and the throbbing of a hundred creations from the great storehouse of Nature, that make a garden more than a dreamland, but certainly a place of great refreshing rest, recuperation, peace, happy thoughts. It is the place to commune with friends, either in bodily presence or in books. It is a place in which to plan, to read, to rest, to work, to play. Back of all there is the utilitarian kitchen garden, the drying yard, the chicken run, the place for the household pets, the children's swing and sand heap, and the other happy features and adjuncts that make the house and garden our *home*.

We believe that one chief reason for the paucity of good and bright gardens is the lack of knowing how to set about making them. Gardening is a very large subject. It has formed the study and recreation of the leisure moments of many eminent men from the time of Solomon, Homer, Aristotle, Plato and others of the ancients, to Erasmus and Bacon of the Renaissance, Evelyn of the seventeenth century, to the more modern notabilities, as Pope, Walpole, Cowper, Goethe, Cobbett,

our own Nathaniel Hawthorne and Thoreau, with many, many others. The amateur gardener is therefore in excellent company of the present as well as of all past times. Gardening is pleasurable, healthful, intellectual.

We should not forget the purely economical side of the matter that has been dwelt upon in the publisher's foreword. But this GARDEN GUIDE is not intended exactly to be a mentor on making money or saving money. You are willing to pay for your household goods and embellishments, your automobile, your camera and sporting outfits, your concerts and theaters. Expect to pay, therefore, for your gardening; yet we can assure the amateur that well-considered expenditure on the garden more than pays for itself. You can have delicious edible Asparagus on your table day in, day out for weeks in the early part of the year. You can have salads and young vegetables from April until November. Then there are the flowers and fruits over and above, and other assets of and from the garden that are too apparent to require mention.

INTRODUCTION TO SIXTH EDITION

In the endeavor to keep abreast of the tremendous increase in gardening interest which has come about since the opening of the Twentieth Century, and particularly in the last score years, we published our first edition of Garden Guide in 1917—a book which, since then, with five separate editions and six reprintings, has sold close up to the 100,000 mark, each edition, through its revision and enlargement, showing a distinctive advance in the quantity and quality of its contents.

Coming now to this present Sixth Edition, and guided by our past experiences, our every endeavor has been to produce a Garden Guide which it will be difficult to improve upon. This has been a task, to be sure, but such a pleasureable one!

It has not been a question of how many pages to make the book, but rather how few. We were concerned with the fact that while instruction on every subject in connection with gardening and home ground beautification was to be given, we should not overburden the reader with a mass of unnecessary words; in brief, it was our aim to make the work so clear, so compact, so practical, and so complete

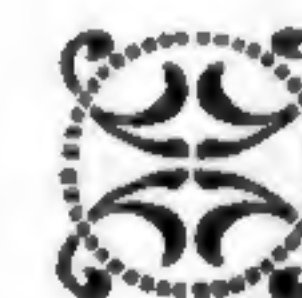
within its limited scope of 576 pages, its small compass and readily accessible pages, all so arranged as to make for ready reference.

Forty years' experience, both practical and editorial, has dictated the manner of its building into one comprehensive unit. The experts who have furnished the great mass of its text, and of whom we make mention on pages vi, vii and viii, were most carefully selected, and each one has given of his best, the result of his personal gardening experience through his many years of study and actual contact with the subject matter of the chapter he covers.

We feel that this present edition pays homage and is a living testimonial to the wonderful advance of interest in gardening now so plainly manifest throughout our entire country.

We have striven on behalf of the amateur gardener to make his pathway to knowledge simple, readily understood, and easily assimilated, in the hope that this book may occupy, for years to come, a niche in the annals of garden development the country wide.

A. T. DE LA MARE.



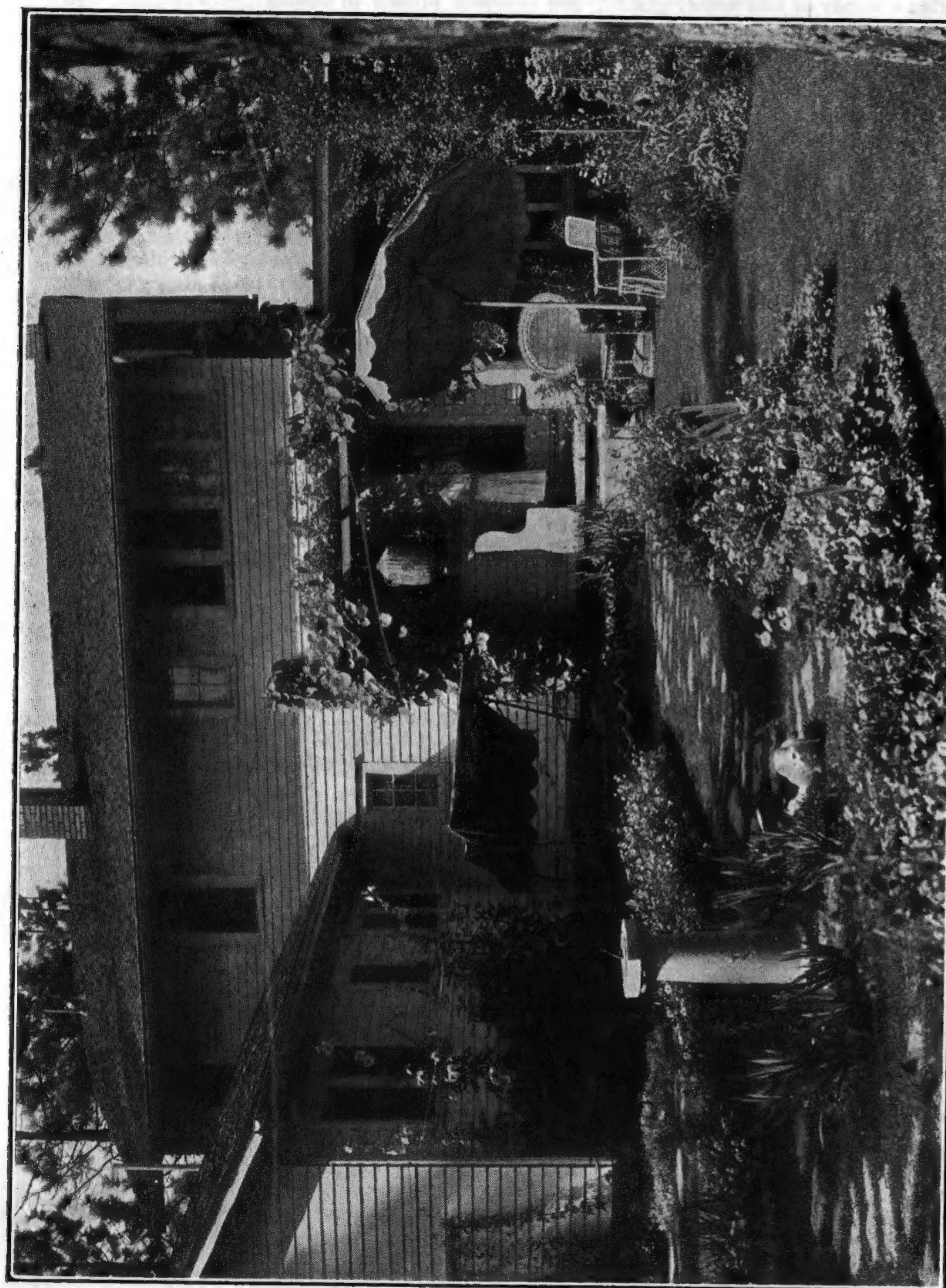
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"We all have our dream gardens"—and sometimes we realize them, as this family has done
This lovely garden was a prize winner in a National Yard and Garden Contest. Do you wonder?

Chapter I

PLANNING THE HOME GROUNDS

By ROBERT B. CRIDLAND

First Considerations—Location of House—Grading the Lawn—Seeding the Lawn—Paths—Selection of Plant Material—Small Formal Flower Gardens—Vegetable and Fruit Garden—Trees, Shrubs and Cover Plants—Planting Plans and Keys

FIRST CONSIDERATIONS

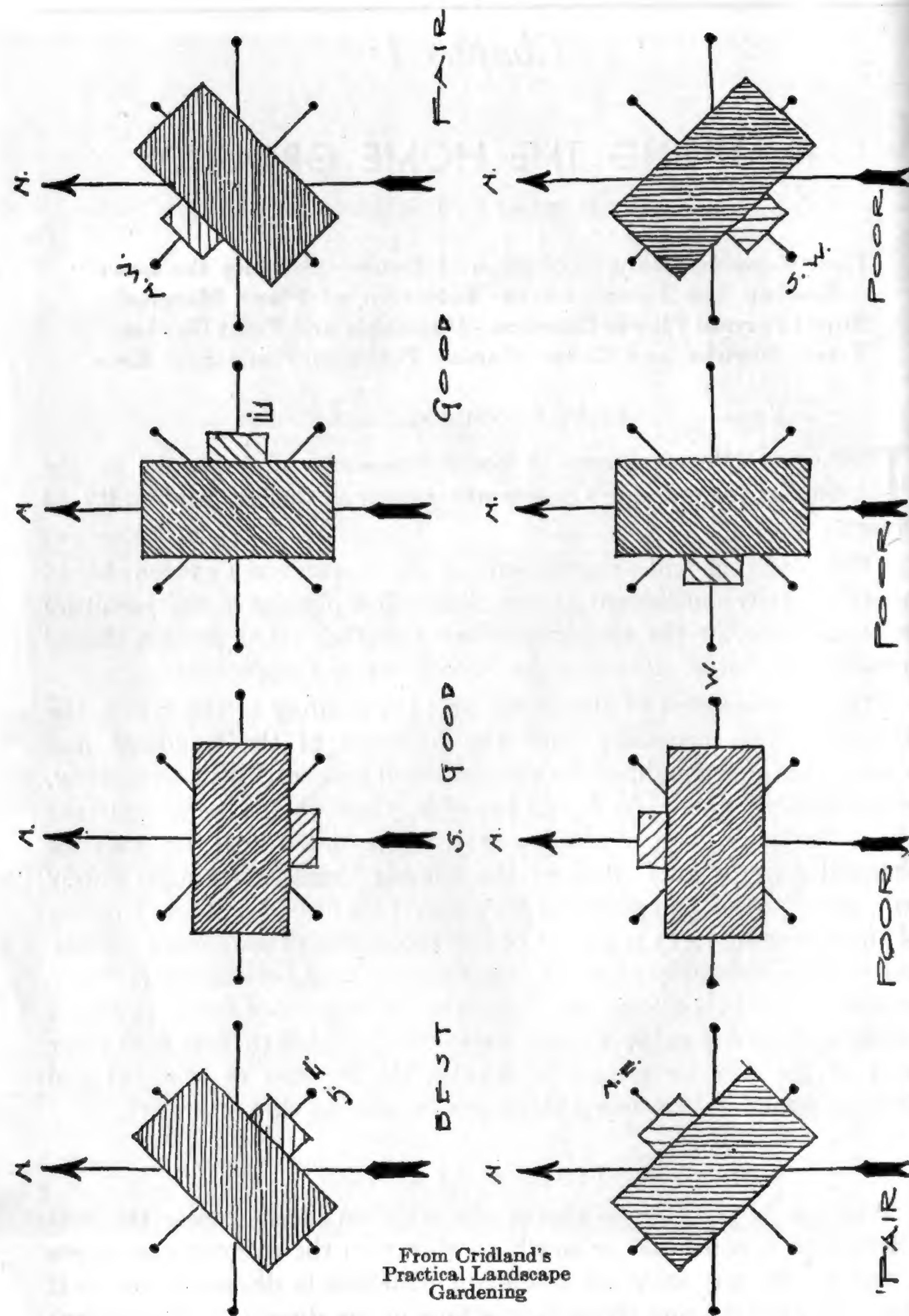
THE first considerations in the composition of a garden or the grounds around one's place are privacy, shelter, and unity of design.

The planning and arrangement of the features of a garden should be as carefully considered as the choice and placing of the furniture in one's home, or the choosing of one's clothes. The garden should present a suitable, agreeable and comfortable composition.

The arrangement of the drives and the grading of the lawns, the drainage when necessary, and the relations of the buildings and other structures should all be preconceived and settled in an orderly, economical manner. As far as possible, there should be no mistake about the main permanent features. The minor features may be changed quite a great deal in the coming years and almost surely will, as new ideas and points of view assert themselves. This changing of the minor features is a part of the recreation of gardening. Thus, one may considerably alter the contour of a shrubbery border, or may indeed eliminate it altogether. The same holds good of flower beds and borders which are easily altered, removed or added to; but with large trees or the heavier groups of shrubs, the expense of removal and shifting prohibit this being done except out of dire necessity.

LOCATION OF HOUSE

Where it is possible to choose the location of the house the best orientation is southeast or south, as shown in the diagrams on pages 2 and 3. In any case, as abundant sunshine is desirable, see to it that the windows and living rooms face in the direction of abundant



Facing Southeast is the best exposure of the house in relation to the sun

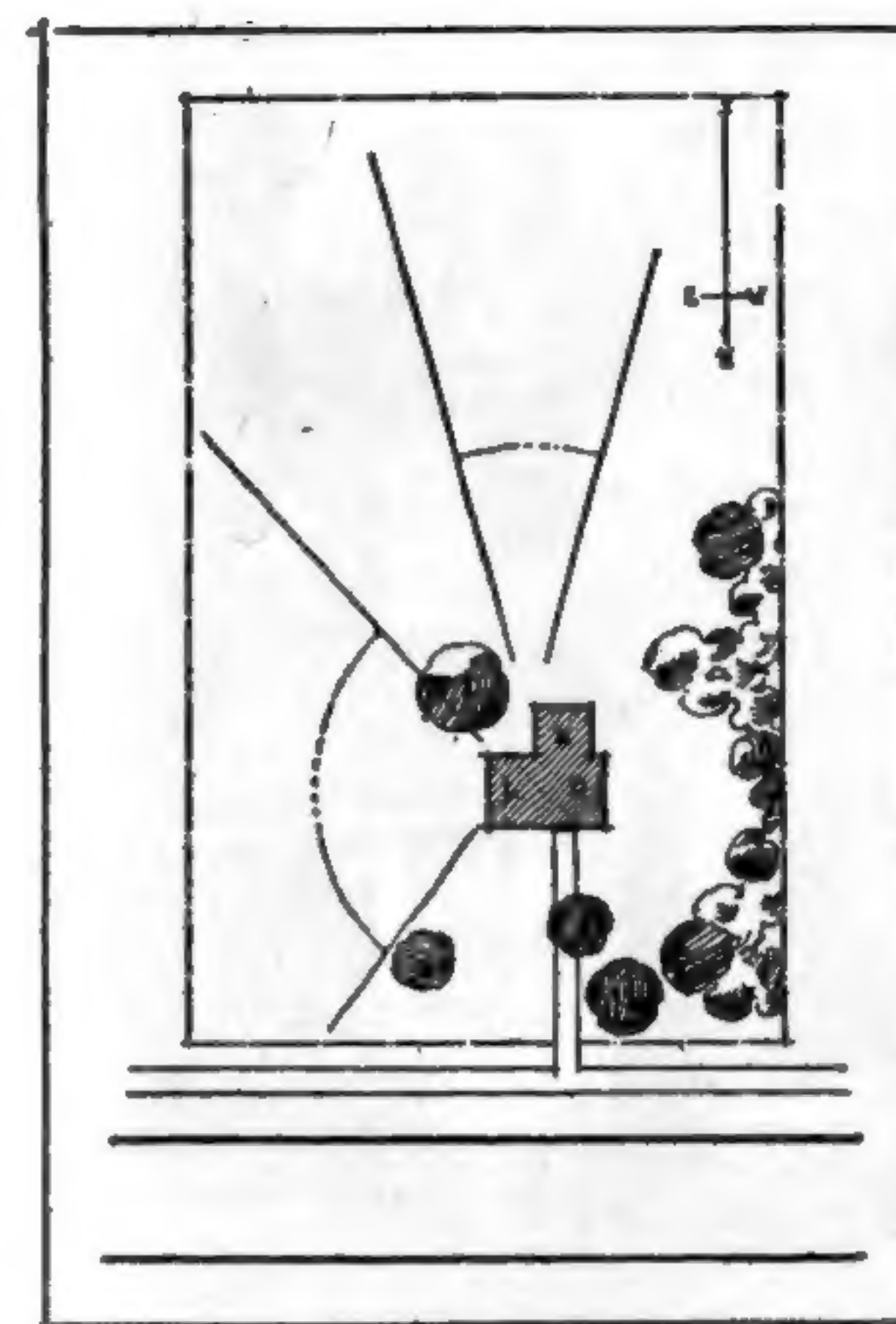


FIG. A — Planting plan to insure best effect of shade, outlook, protection, and privacy on a lot facing north

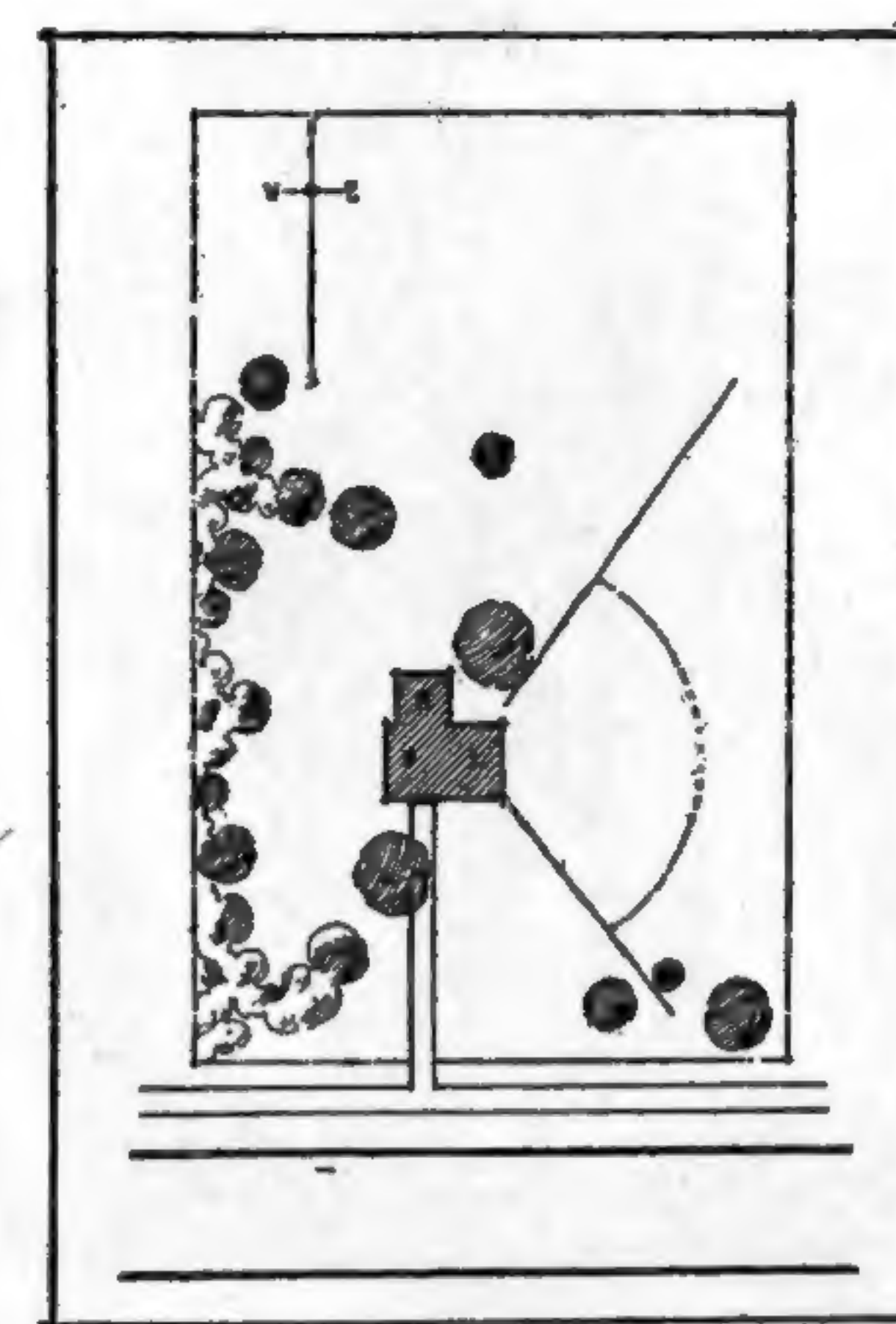


FIG. B — Planting plan to insure best effect of shade, outlook, protection, and privacy on a lot facing south

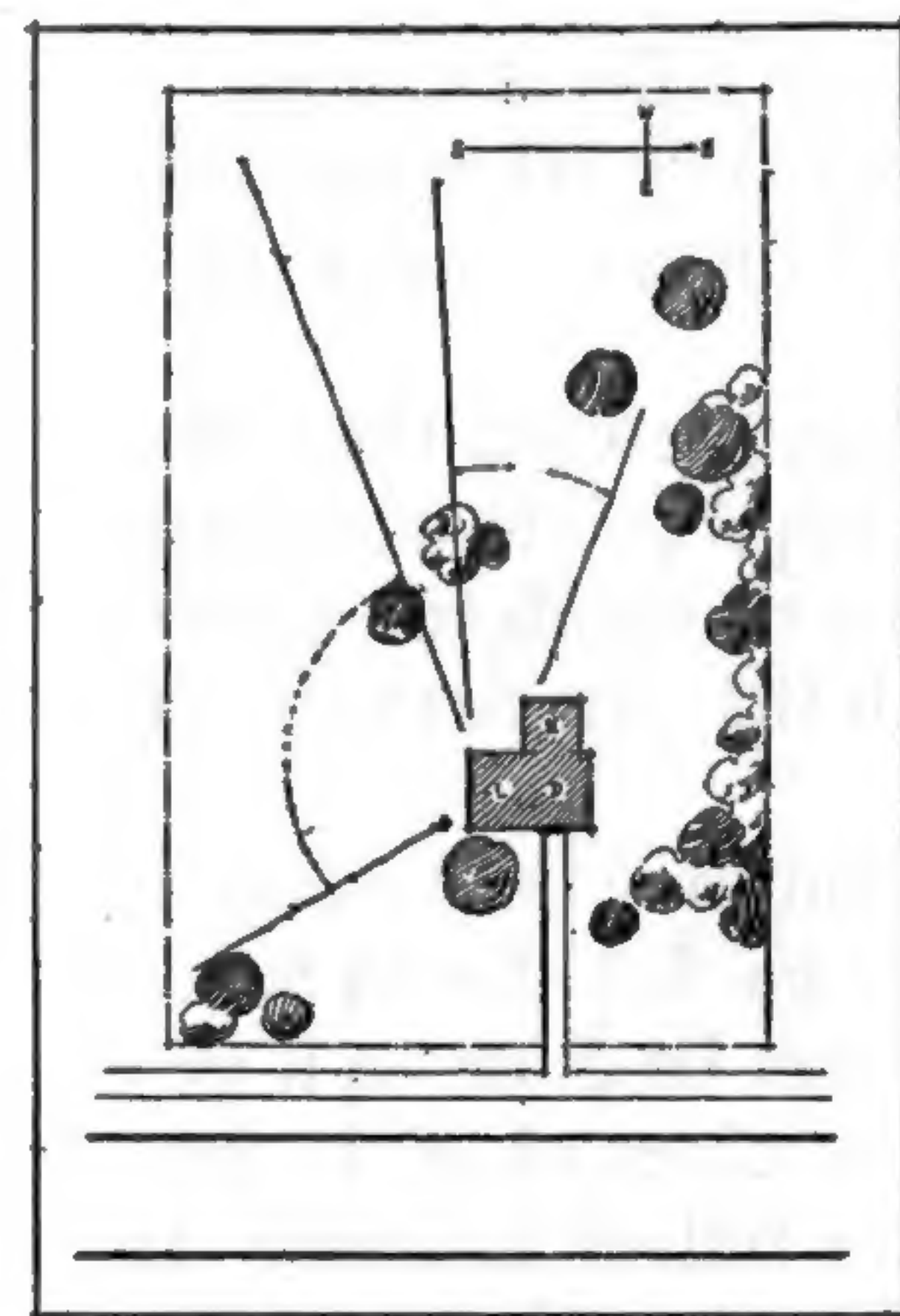


FIG. C — Planting plan to insure best effect of shade, outlook, protection and privacy on a lot facing east

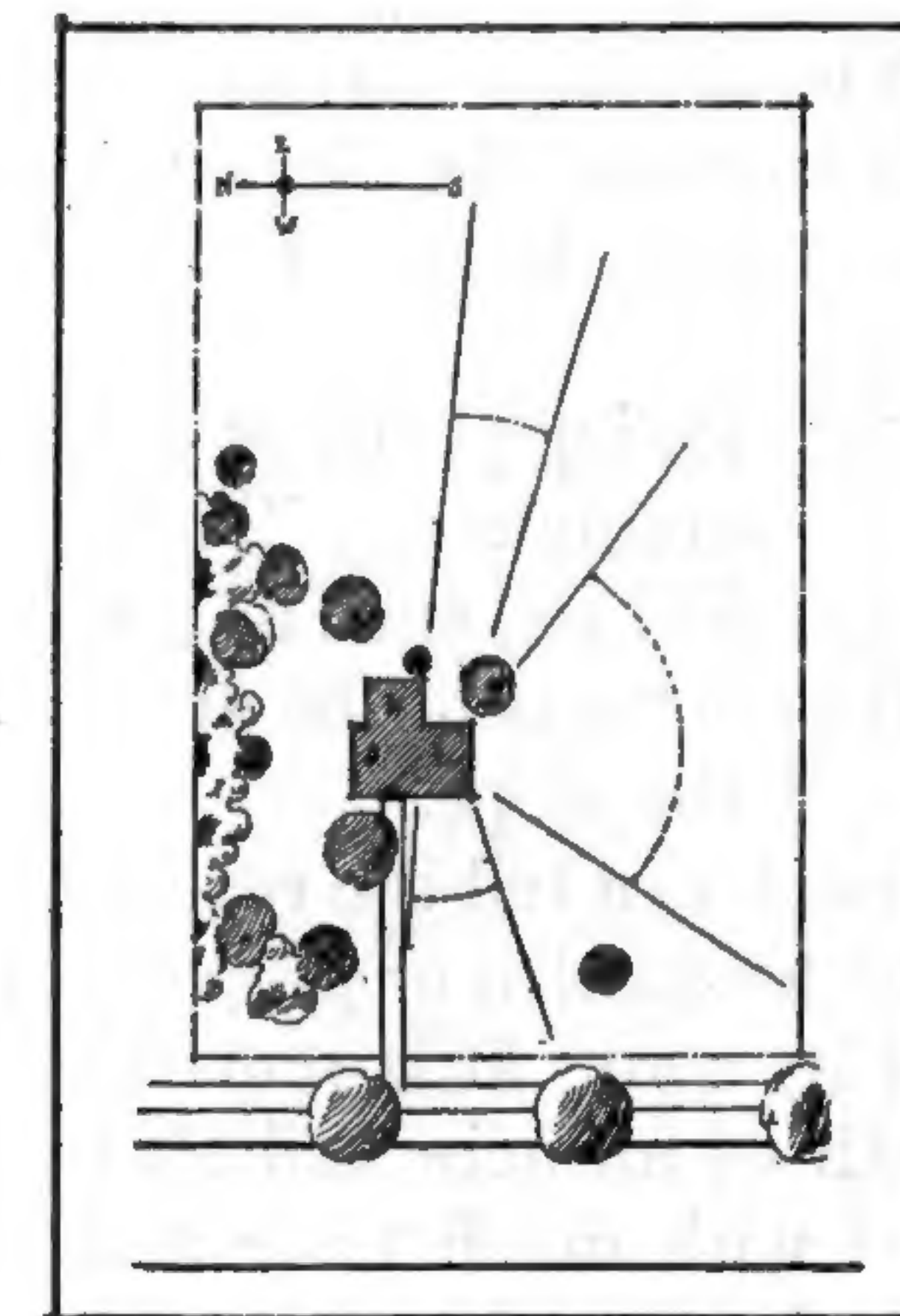


FIG. D — Planting plan to insure best effect of shade, outlook, protection and privacy on a lot facing west



The base planting provides a happy union between lawn and house, and pyramidal evergreens make pleasing accents against the wall or as a frame to an architectural feature. They may also be used to advantage in concealing the roof leaders

light. Those places that are hidden beneath a dense canopy or half a forest of trees may be pleasing to some, but they are rather depressing to most people, besides being, one should imagine, not conducive to health.

While winding paths or drives are often graceful, they should not be made meaninglessly. They are only appropriate where there is a permanent feature, such as a valuable tree or shrub to be avoided, or where the contours of the ground are such that the path should follow the line of the slope.

No book can tell the reader exactly what may be the best arrangement for his garden or property, for every garden should have a character of its own. It is remarkable what can be done on a quarter or an eighth of an acre and there are many plots of 30 ft. by 100 ft. designed with much taste and which are full of interest. In those towns and cities of our own country and in the older countries where the inhabitants, almost to a man, appreciate the elegancies of gardening, the little places exhibit the utmost variety of character in their composition.

It is all too true that thousands of gardens and grounds all around our American homes are bare to desolation. The democratic idea against the planting of hedges and the lining off of one's property promotes deadly uniformity. The arguments that unhedged or unfenced grounds would be contrary to the best artistic conception and treatment of a city or a suburb as a whole ought not to be allowed to sway the property owner from making the most and the best of his own place. There is a school of city planners which seems to set its face against this, encouraging the open community type of home grounds. The latter will never get us anywhere as a nation of garden lovers, for the theory almost entirely precludes the practice of finer gardening. We plead rather to see places nicely hedged or fenced off for the sake of the enjoyment and encouragement of that quiet privacy without which the true pleasures of gardening cannot be obtained.

GRADING THE LAWN

The first step in the development of the property is the grading of the lawn area. The modified grades should be such that all the surface water shall drain away from the buildings and in the same general direction as formerly. If it should be found that it is not practical to carry the water away over the surface, it is quite satisfactory to place drains in the low points and carry the water off by terra cotta pipe connected with the drain provided for roof leaders. This discharge pipe should always lead into the street and never into the sewage wells unless the subsoil is very porous.

Before excavating for the cellar all the top soil, which generally extends 4 to 6 in. below the surface, should be removed and placed 10 ft. beyond the house walls for future use when the finished grading is done. This should also be done where cutting and filling of the ground surface takes place. In the event that the top soil is of a poor quality, it is quite feasible to improve it by adding humus to a loamy soil and sharp sand to a clay soil. Some granulated peatmoss may also be added to the latter type, the quantity to use depending entirely upon the nature of the soil. Both the humus and the peatmoss should be thoroughly worked through the soil to a depth of 12 to 18 in.

SEEDING THE LAWN

Before seeding, a fertilizer consisting of five parts ground bone and one part muriate of potash applied at the rate of five pounds to



A Stately Terminal Feature

200 sq. ft. and thoroughly worked through the soil is recommended. After the grass has started to grow a top dressing of nitrate of soda distributed at the rate of one half pound to 250 sq. ft. may be applied. Equal parts of bonemeal may be mixed thoroughly with the nitrate of soda to insure a more equable distribution of the nitrate of soda. Three applications of this top dressing may be made to advantage during the Summer, especially if it is done after a rain.

PATHS

Some pains should be taken to have clean, well made paths. Take out 6 or 8 in. of soil and fill with clinkers, rough ashes or stones, finishing off with smaller stones, bound or rolled in with a little soil. For a strong permanent road concrete may be employed. If a cement surface is objected to gravel can be strewn over and rolled in before the cement sets. Grass paths are comfortable and brick is also good. It is well to have a tile, slate or wooden edging to the paths as this promotes neatness and is easier to care for.

SELECTION OF PLANT MATERIAL

There should be a careful selection of the plant material to be used and special attention should be given to the colors of the blossoms and the season of bloom, thus insuring a sequence of interest in the flowers, fruits and twigs. In the accompanying plans (pages 11 to 29) the selection of plant material and its arrangement has been made with the purpose of giving each individual plant ample area in which to develop fully, rather than the more prodigal plan of a massed planting. This method is better suited to the moderate sized home grounds.

On the properties shown the main body of the house is usually placed at a point one-third of the distance back from the property line. The position of the home from the side property lines is also restricted, usually from 10 to 25 ft. according to the width of the lot. Quarters for the car are often provided in the house basement, but if a garage is to be erected it should be placed not less than 25 ft. from the nearest point of the house.

For reasons of economy the approach to the garage may consist of two tracks 18 in. wide, as are indicated on the diagrams.

SMALL FORMAL FLOWER GARDENS

In each of the plans a little interest has been added by including small, formal flower or Rose gardens. The beds in these gardens, as

well as those at the base of the house, should be excavated to a depth of not less than 18 in., and refilled with a mixture of good soil and well rotted manure (preferably cow manure) thoroughly worked through the soil. In the Rose gardens, if the drainage is not likely to be satisfactory, the excavation should be increased to 2 ft. and broken stone placed in the bottom to a depth of 6 in. and covered with old sod before refilling with the top soil.

VEGETABLE AND FRUIT GARDEN

A vegetable garden has been provided on each property where it will be quite practical to grow a few vegetables of the smaller varieties, and afford a source of relaxation and pleasure to those inclined to care for these utilitarian features. In every instance fruit trees are provided, and it is recommended that dwarf sorts be used, except in Plan No. 4 where it is desired to form an arched effect over the walk between the trees.

TREES, SHRUBS AND COVER PLANTS

In the main, deciduous trees and shrubs have been specified



A generous plantation near the house where the grade falls away will give a more peaceful aspect by reason of the top of the foliage being on the same plane as the lawn at the higher elevation

because of the opportunity of establishing a more varied texture effect than is possible with evergreens. For those who may prefer a Winter effect, especially in the base planting, the following conifers are suggested as good substitutions for the deciduous shrubs:

Shrubs of a pyramidal habit for planting at the corners and in front of columns or roof leaders: *Thuja pyramidalis*, *Taxus baccata hibernica*, *Juniperus communis hibernica*, *Juniperus columnaris*, *Juniperus virginiana schottii* or *cannarti*.

Shrubs to plant between these pyramidal accents: *Taxus cuspidata*, *Taxus brevifolia*, *Thuja nana aurea*, *Thuja occidentalis globosa*, *Thuja occidentalis siberica*, *Juniperus communis depressa plumosa*, *Juniperus chinensis pfitzeriana* (this, however, is likely to grow rapidly and become too large for a base planting in front of porches where the floor level is rather close to the ground).

The *Chamaecyparis* or Japanese Cypress embraces a large variety of evergreens. These are very satisfactory for base planting, and as they may be sheared and kept within bounds, are quite desirable for the purpose. The following varieties are recommended: *Chamaecyparis pisifera plumosa*, *C. p. plumosa aurea*, *C. pisifera*, *C. p. aurea*, *C. p. squarrosa*. The last is a blue-gray variety of beautiful texture. The smaller sorts, such as *Chamaecyparis lawsoniana gracilis*, *C. obtusa* and *C. o. nana* are excellent for base plantings where slower growing plants are desired. It is well not to plant them too closely together as evergreens soon lose their foliage when crowded.

Ground cover plants may be placed among these shrubs, the following varieties being good for the purpose: *Ceratostigma plumbaginoides*, *Vinca minor*, *Vinca alpina* (which is especially desirable and more unusual than the former variety), *Nepeta mussini*, *Pachysandra terminalis*, *Iberis sempervirens* and the *Violas* (Tufted Pansies). Some bulbous plants may be used in connection with the cover plants and will add to the interest of the plantation in the Spring season. The use of cover plants makes it possible to space the more expensive shrubs farther apart at a considerable saving.

Lastly, there is no place too uncompromising that it cannot by dint of knowledge, skill, effort and some small financial expenditure be made into a beautiful garden. Train your powers of observation; at every turn you will gain some experiences or suggestions that may be modified or adopted with profit on your own grounds.

KEY TO PLANTING PLAN NO. 1

Key No.	Quantity	Botanical Name	Common Name
1	2	<i>Tilia vulgaris</i>	European Linden
2	1	<i>Cornus florida rubra</i>	Redflowering Dogwood
3	1	<i>Kolkwitzia amabilis</i>	Beautybush
4	1	<i>Cercis chinensis</i>	Chinese Redbud
5	1	<i>Clethra alnifolia</i>	Summersweet
6	1	<i>Amygdalus nana</i>	Russian Almond
7	1	<i>Deutzia lemoinei</i>	Lemoine Deutzia
8	1	<i>Philadelphus Virginal</i>	Mockorange
9	1	<i>Spiraea vanhouttei</i>	Vanhoutte Spirea
10	1	<i>Cydonia japonica</i>	Flowering Quince
11	1	<i>Spiraea prunifolia</i>	Bridalwreath
12	1	<i>Forsythia suspensa fortunei</i>	Fortune Forsythia
13	1	<i>Daphne mezereum</i>	February Daphne
14	1	<i>Magnolia soulangeana</i>	Saucer Magnolia
15	8	<i>Taxus cuspidata</i> (capitate form)	Japanese Yew
16	1	<i>Deutzia gracilis</i>	Slender Deutzia
17	1	<i>Amygdalus nana</i>	Russian Almond
18	1	<i>Kerria japonica</i>	Single Kerria
19	1	<i>Deutzia lemoinei</i>	Lemoine Deutzia
20	1	<i>Spiraea Anthony Waterer</i>	Anthony Waterer Spirea
21	1	<i>Azalea amoena</i>	Amoena Azalea
22	1	<i>Ilex glabra</i>	Inkberry
23	1	<i>Abelia grandiflora</i>	Glossy Abelia
24	1	<i>Azalea indica rosea</i>	Sekidera Azalea
25	1	<i>Azalea mollis</i>	Chinese Azalea
26	1	<i>Cercis chinensis</i>	Chinese Redbud
27	1	<i>Caragana arborescens</i>	Siberian Pea-tree
28	1	<i>Malus ioensis</i>	Prairie Crab
29	1	<i>Viburnum carlesi</i>	Fragrant Viburnum
30	1	<i>Hibiscus coelestis</i>	Single Blue Althea
31	1	<i>Viburnum tomentosum plicatum</i>	Japanese Snowball
32	1	<i>Weigela rosea</i>	Pink Weigela
33	1	Apple	
34	1	Pear, Bartlett	
35	1	Pie Cherry	
36	1	Apricot	
37	1	Pie Cherry	
38	1	Pear Sheldon	
39	1	Apple	
40		Annuals and perennials	
41	1	<i>Kerria japonica</i>	Single Kerria
42	1	<i>Caryopteris incana</i>	Bluebeard
43	1	<i>Deutzia gracilis</i>	Slender Deutzia
44	1	<i>Amygdalus nana rosea</i>	Flowering Almond
45	1	<i>Abelia grandiflora</i>	Glossy Abelia
46	1	<i>Kolkwitzia amabilis</i>	Beautybush
47	1	<i>Viburnum lantana</i>	Wayfaring-tree
48	49	<i>Ligustrum amurense</i>	Amur Privet

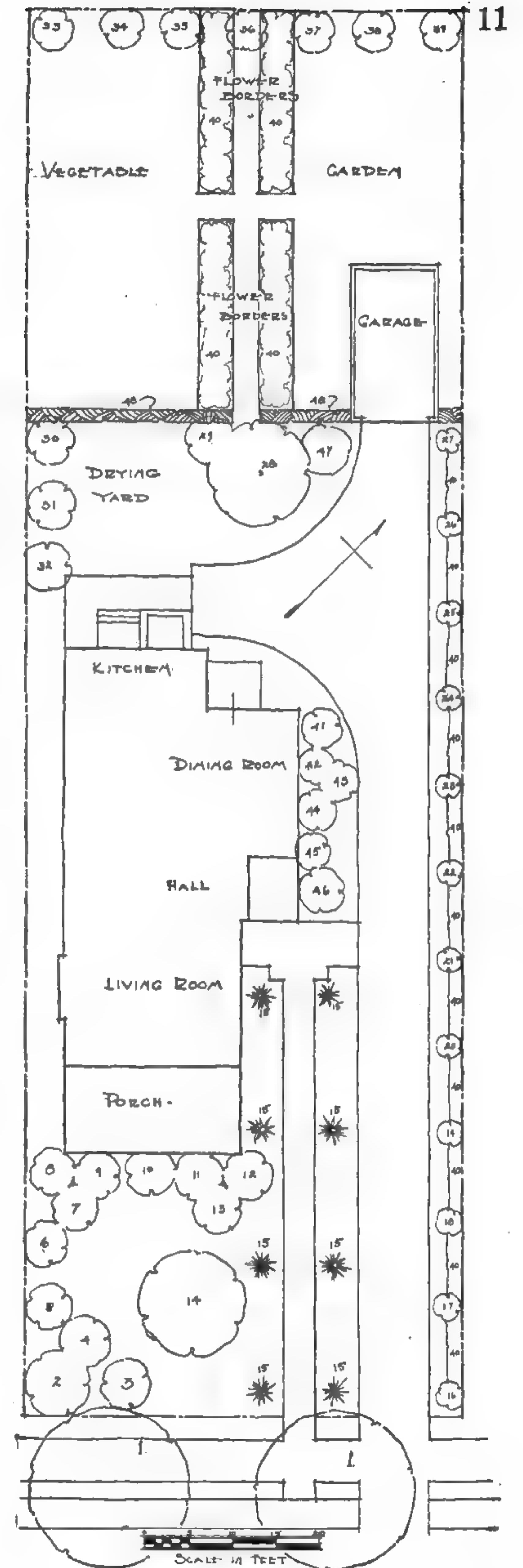
NOTES ON PLAN NO. 1

Plan No. 1 shows a long, narrow lot 65 ft. by 150 ft.—an awkward proportion which is often found in the residential sections of cities. This uncrowded arrangement presents an adequate solution of the difficult problem and combines many features of utility with a pleasant arrangement of shrub and flower material.

The facility for turning the automobile, the drying yard and the pleasing axis from the dining room door to the rear property line should be especially noted.

The following alternatives in the plant material are suggested if the owner should wish a more formal evergreen base planting.

Key No.	Botanical Name
7	One <i>Juniperus chinensis pfitzeriana</i>
8	One <i>Taxus cuspidata</i> (capitate form)
9	One <i>Viburnum rhytidophyllum</i>
10	One <i>Ilex glabra</i>
11	One <i>Viburnum rhytidophyllum</i>
12	One <i>Taxus cuspidata</i> (capitate form)
13	One <i>Juniperus chinensis pfitzeriana</i>



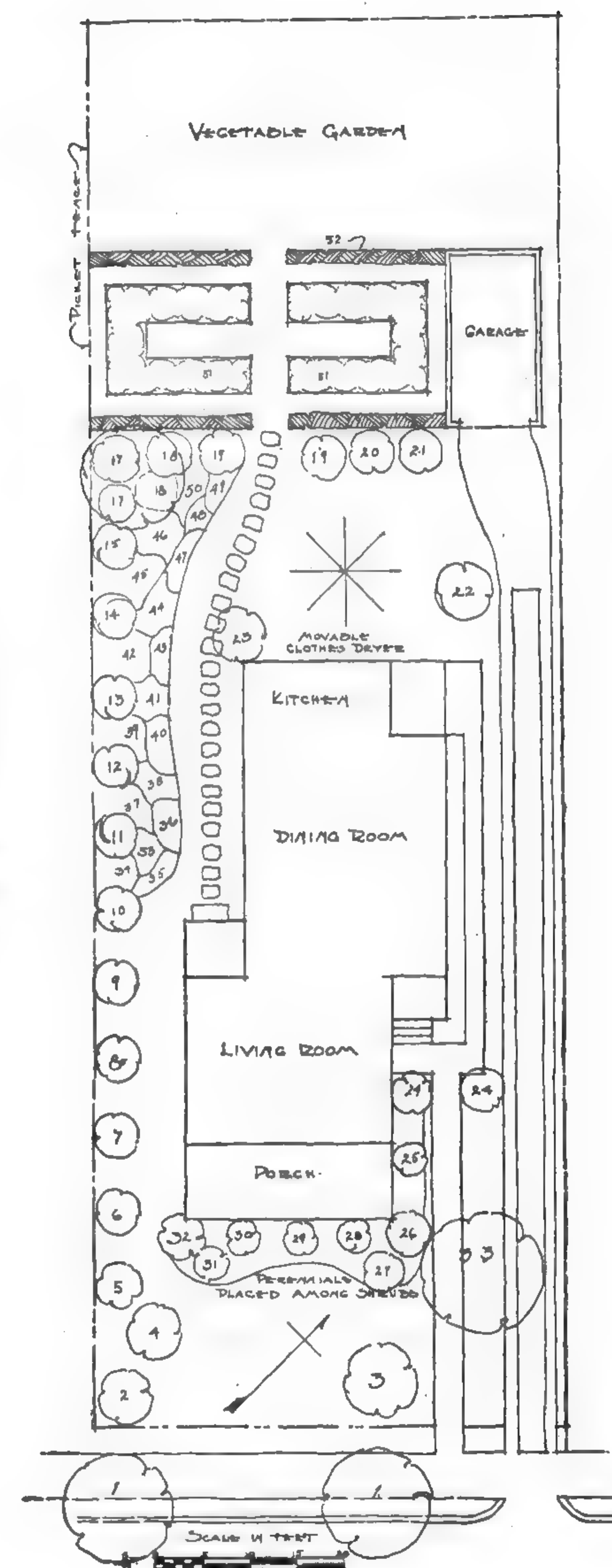
KEY TO PLANTING PLAN NO. 2

Key No.	Quantity	Botanical Name	Common Name
1	2	Liquidambar styraciflua	Sweetgum
2	1	Euonymus alatus	Winged Euonymus
3	1	Malus scheideckeri	Scheidecker Crab
4	1	Cydonia japonica	Flowering Quince
5	1	Philadelphus Avalanche	Mockorange
6	1	Kerria japonica	Single Kerria
7	1	Clethra alnifolia	Summersweet
8	1	Callicarpa purpurea	Chinese Beautyberry
9	1	Viburnum tomentosum plicatum	Japanese Snowball
10	1	Hibiscus coelestis	Single Blue Althea
11	1	Hydrangea paniculata	Panicle Hydrangea
12	1	Weigela rosea	Pink Weigela
13	1	Syringa vulgaris Ludwig Spaeth	Lilac
14	1	Syringa josikaea	Hungarian Lilac
15	1	Syringa Charles the Tenth	Lilac
16	1	Crataegus oxyacantha splendens	Paul Double Scarlet Hawthorn
17	1	Symphoricarpos vulgaris	Coralberry
18	2	Symphoricarpos racemosus	Snowberry
19	2	Exochorda grandiflora	Pearlbush
20	1	Forsythia fortunei	Fortune Forsythia
21	1	Hibiscus syriacus Duchesse de Brabant	Shrub-althea
22	1	Rhus cotinus	Smoketree
23	1	Philadelphus coronarius	Sweet Mockorange
24	2	Juniperus virginiana schottii	Schott Redcedar
25	1	Azalea amoena	Amoena Azalea
26	1	Pieris floribunda	Mountain Andromeda
27	1	Azalea ledifolia	Snow Azalea
28	1	Pieris japonica	Japanese Andromeda
29	1	Azalea hinodegiri	Hinodegiri Azalea
30	1	Pieris japonica	Japanese Andromeda
31	1	Azalea ledifolia	Snow Azalea
32	1	Pieris floribunda	Mountain Andromeda
33	1	Ginkgo biloba	Maidenhair-tree
34	8	Delphinium Belladonna	Larkspur
35	7	Dianthus Newport	
36	9	Stokesia laevis	
37	7	Coreopsis grandiflora	Big Coreopsis
38	6	Iris pallida dalmatica	
39	6	Aconitum napellus	Aconite
40	9	Mertensia virginica	Virginia Bluebells
41	6	Iris Canary Bird	
42	10	Phlox Rijnstroom	
43	10	Nepeta mussini	
44	9	Sidalcea Rosy Gem	
45	10	Iris kaempferi Purple and Gold	
46	7	Hemerocallis Apricot	Daylily
47	7	Anemone Queen Charlotte	
48	5	Linum perenne	Perennial Flax
49	5	Salvia azurea	Azure Sage
50	6	Iris Emperor	
51		Roses or Perennials and Annuals	
52	102	Ligustrum ovalifolium	California Privet
53	7	Lilium candidum	Madonna Lily

NOTES ON PLAN NO. 2

Plan No. 2 shows a development for the average lot of 50 ft. by 150 ft. The informal perennial border is the distinctive feature, and combined with the Rose garden, will supply cut flowers throughout the entire season.

The garage wall forms an excellent background for climbing Roses and will be of value in giving a feeling of enclosure to the Rose garden.



KEY TO PLANTING PLAN NO. 3

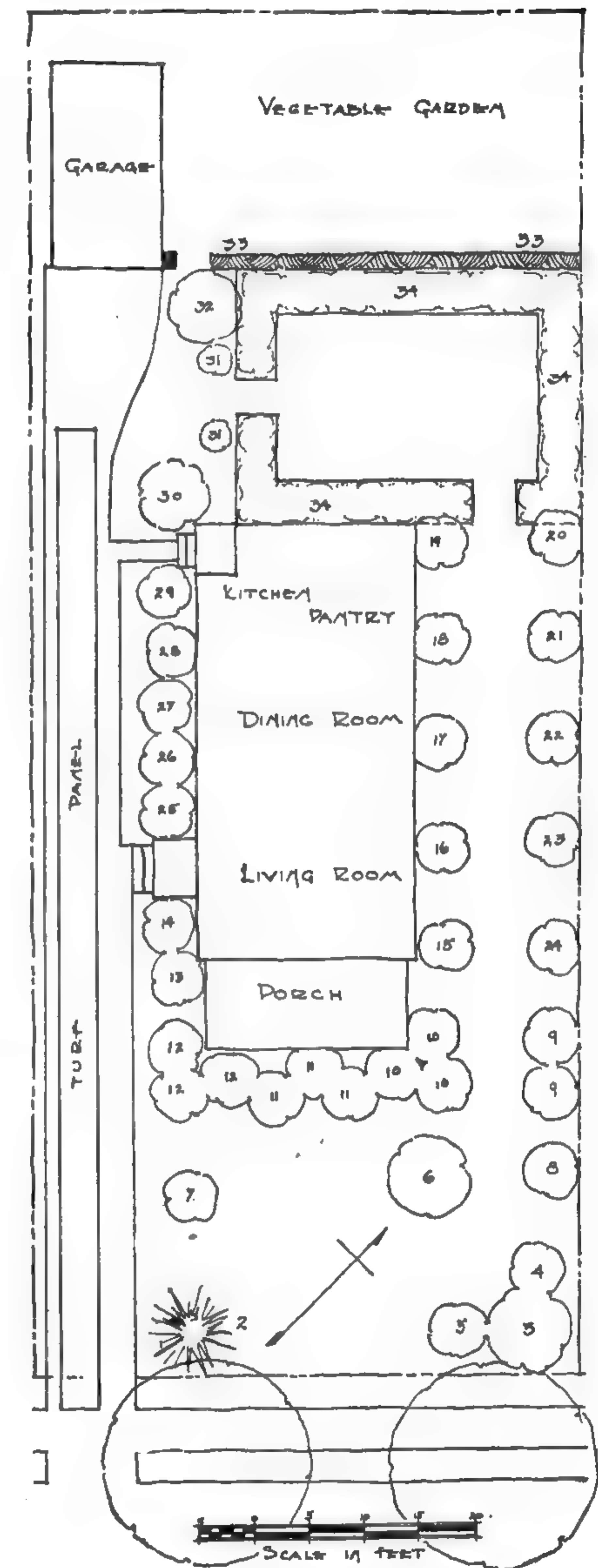
Key No.	Quantity	Botanical Name	Common Name
1	2	<i>Acer saccharum</i>	Sugar Maple
2	1	<i>Pseudotsuga douglasii</i>	Douglas-fir
3	1	<i>Cornus florida</i>	Flowering Dogwood
4	1	<i>Cercis chinensis</i>	Chinese Redbud
5	1	<i>Cydonia japonica</i>	Flowering Quince
6	1	<i>Styrax japonica</i>	Japanese Snowbell
7	1	<i>Sorbus aucuparia</i>	European Mountain-ash
8	1	<i>Kolkwitzia amabilis</i>	Beautybush
9	2	<i>Kerria japonica</i>	Single Kerria
10	3	<i>Ilex glabra</i>	Inkberry
11	3	<i>Azalea amoena</i>	Amoena Azalea
12	3	<i>Cotoneaster francheti</i>	Franchet Cotoneaster
13	1	<i>Spiraea prunifolia</i>	Bridalwreath
14	1	<i>Hibiscus coelestis</i>	Single Blue Althea
15	1	<i>Philadelphus Virginal</i>	Mockorange
16	1	<i>Weigela Eva Rathke</i>	Red Weigela
17	1	<i>Hydrangea paniculata</i>	Panicle Hydrangea
18	1	<i>Syringa Charles the Tenth</i>	Lilac
19	1	<i>Viburnum lantana</i>	Wayfaring-tree
20	1	<i>Viburnum tomentosum plicatum</i>	Japanese Snowball
21	1	<i>Ribes aureum</i>	Slender Golden Currant
22	1	<i>Berberis vulgaris</i>	European Barberry
23	1	<i>Forsythia fortunei</i>	Fortune Forsythia
24	1	<i>Calycanthus floridus</i>	Sweetshrub
25	1	<i>Hibiscus syriacus Lady Stanley</i>	Shrub-althea
26	1	<i>Deutzia lemoinei</i>	Lemoine Deutzia
27	1	<i>Amygdalus nana</i>	Russian Almond
28	1	<i>Abelia grandiflora</i>	Glossy Abelia
29	1	<i>Syringa vulgaris Marie Legraye</i>	Lilac
30	1	<i>Syringa vulgaris Ludwig Spaeth</i>	Lilac
31	2	<i>Juniperus communis hibernica</i>	Irish Juniper
32	1	<i>Ginkgo biloba</i>	Maidenhair-tree
33	66	<i>Ligustrum ovalifolium</i>	California Privet
34		Annuals and Perennials	

NOTES ON PLAN NO. 3

Plan No. 3 represents an exceedingly simple arrangement of house, garden, garage and vegetable garden on a lot 50 ft. by 125 ft. This simplicity, however, is so well worked out that the scheme includes many interesting features without seeming crowded. For instance, the front walk and the service walk are combined into one unit with the garage tracks, which eliminates duplication of glaring masonry work. A collapsible clothes dryer may be set up in the perennial garden when needed.

The walk to the east of the house is lined with specimen shrubs, interesting not only for their blossoms but also for their fruits and leaf textures.

The base planting along the porch is composed of fairly low growing broadleaf evergreens, which will be appreciated at all seasons.



KEY TO PLANTING PLAN NO. 4

Key No.	Quantity	Botanical Name	Common Name
1	4	Platanus orientalis	European Plane
2	1	Chionanthus virginica	White Fringetree
3	1	Spiraea prunifolia	Bridalwreath
4	1	Hibiscus syriacus rubis	Single Pink Althea
5	1	Rhus cotinus	Smoketree
6	1	Viburnum tomentosum plicatum	Japanese Snowball
7	1	Deutzia lemoinei	Lemoine Deutzia
8	1	Mahonia aquifolium	Oregon Hollygrape
9	1	Berberis julianae	Wintergreen Barberry
10	1	Mahonia bealei	Leatherleaf Hollygrape
11	1	Azalea mollis	Chinese Azalea
12	1	Azalea hinodegiri	Hinodegiri Azalea
13	1	Azalea Christmas Cheer	
14	1	Azalea indica	Indica Azalea
15	2	Azalea ledifolia rosea	Sekidera Azalea
16	1	Azalea kaempferi	Torch Azalea
17	1	Azalea macrantha	Red Salmon Azalea
18	1	Azalea indica	Indica Azalea
19	1	Azalea calendulacea	Flame Azalea
20	1	Azalea vaseyi	Pinkshell Azalea
21	1	Azalea indica	Indica Azalea
22	1	Azalea indica	Indica Azalea
23	1	Azalea amoena	Amoena Azalea
24	1	Azalea amoena	Amoena Azalea
25	1	Cornus florida rubra	Redflowering Dogwood
26	2	Apple Stayman Winesap	
27	2	Apple Grimes Golden	
28	1	Apple Northern Spy	
29	1	Apple Smokehouse	
30	1	Apple York Imperial	
31	1	Apple McIntosh	
32	1	Apple Delicious	
33	1	Apple Black Twig	
34	1	Apple Summer Rambo	
35	1	Apple Wealthy	
36	500	Annuals and Perennials	
37	2	Prunus Amanogawa	Japanese Flowering Cherry
38	1	Sorbus aucuparia	European Mountain-ash
39	1	Buxus sempervirens suffruticosa	Truedwarf Box
40	1	Malus ioensis	Prairie Crab
41	34	Nepeta mussini	Nepeta
42	18	Ceratostigma plumbaginoides	Larpenle Plumbago
43	10	Vinca alpina	Periwinkle
44	15	Phlox amoena	Amoena Phlox
45	415	Ligustrum amurense	Amur Privet

NOTES ON PLAN NO. 4

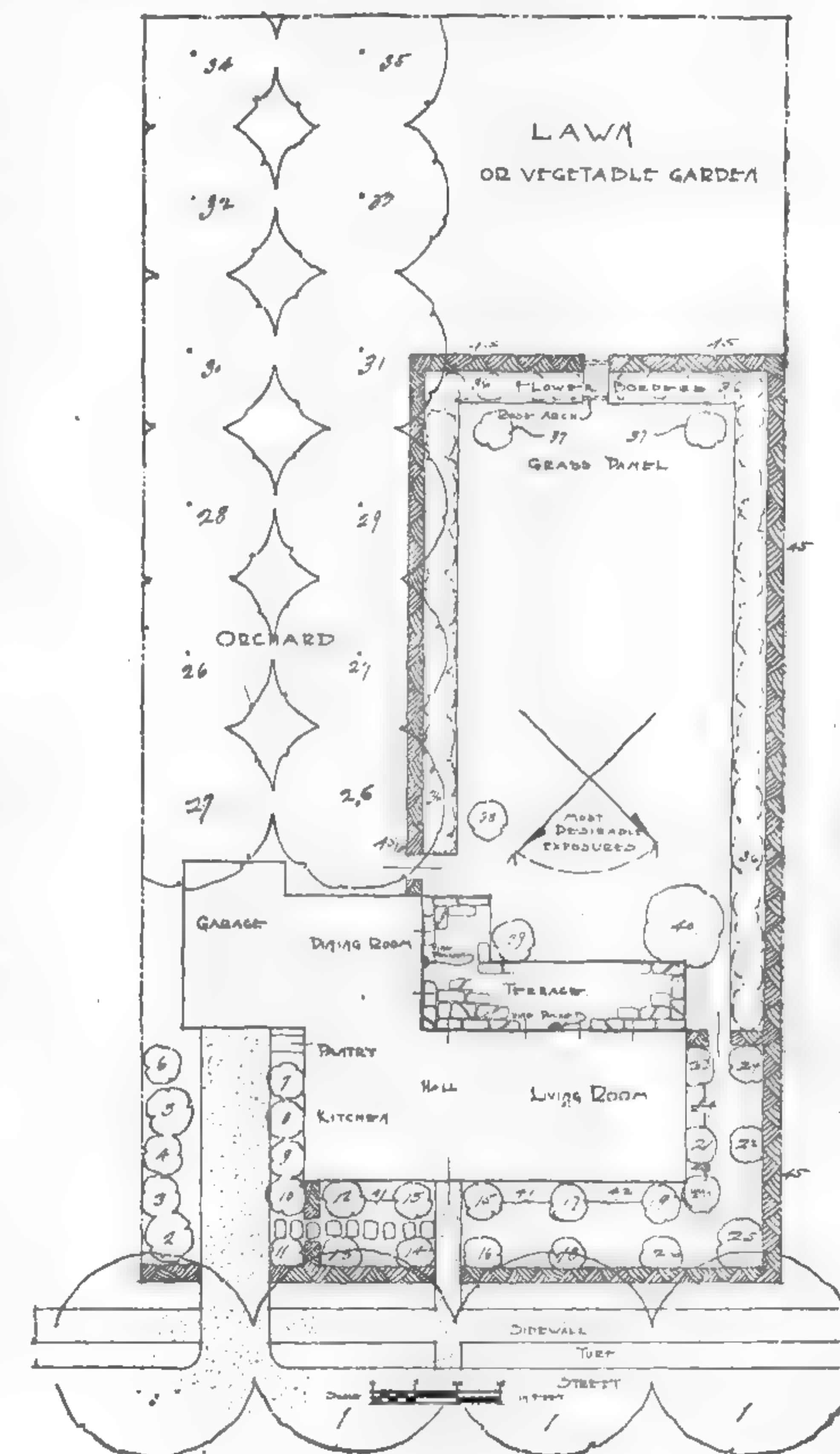
This development on a lot 75 ft. by 150 ft. with a northeastern to a northwestern exposure is suggested to the home owner who desires the utmost in organization and privacy from his property. If the building laws require the residence to be a greater distance back from the street, the whole scheme may be moved in the direction of the rear line and the lawn transferred to the front of the house.

The cost of working out this plan could be kept at a minimum as the hedge, the perennials and the dozen small fruit trees need not be expensive.

The terrace is a pleasing link between house and garden and with its southern exposure is useful almost the entire year. It also makes a pleasant dining terrace in Summer. It could be built economically of bricks laid in sand, but care should be taken to see that whatever material is used harmonizes with the house. Small semi-circular spaces should be left in the terrace at the base of the house in which vines may be planted.

The grass panel is large enough to accommodate a croquet lawn.

The type of house plan shown here, with the kitchen facing the street and the living room and dining room opening on the garden, is constantly growing in favor in this country. Its advantages are numerous and its faults few. It makes the most of an "undesirable" northern exposure lot, and if there are small children in the family it has a tendency to keep them off the street.



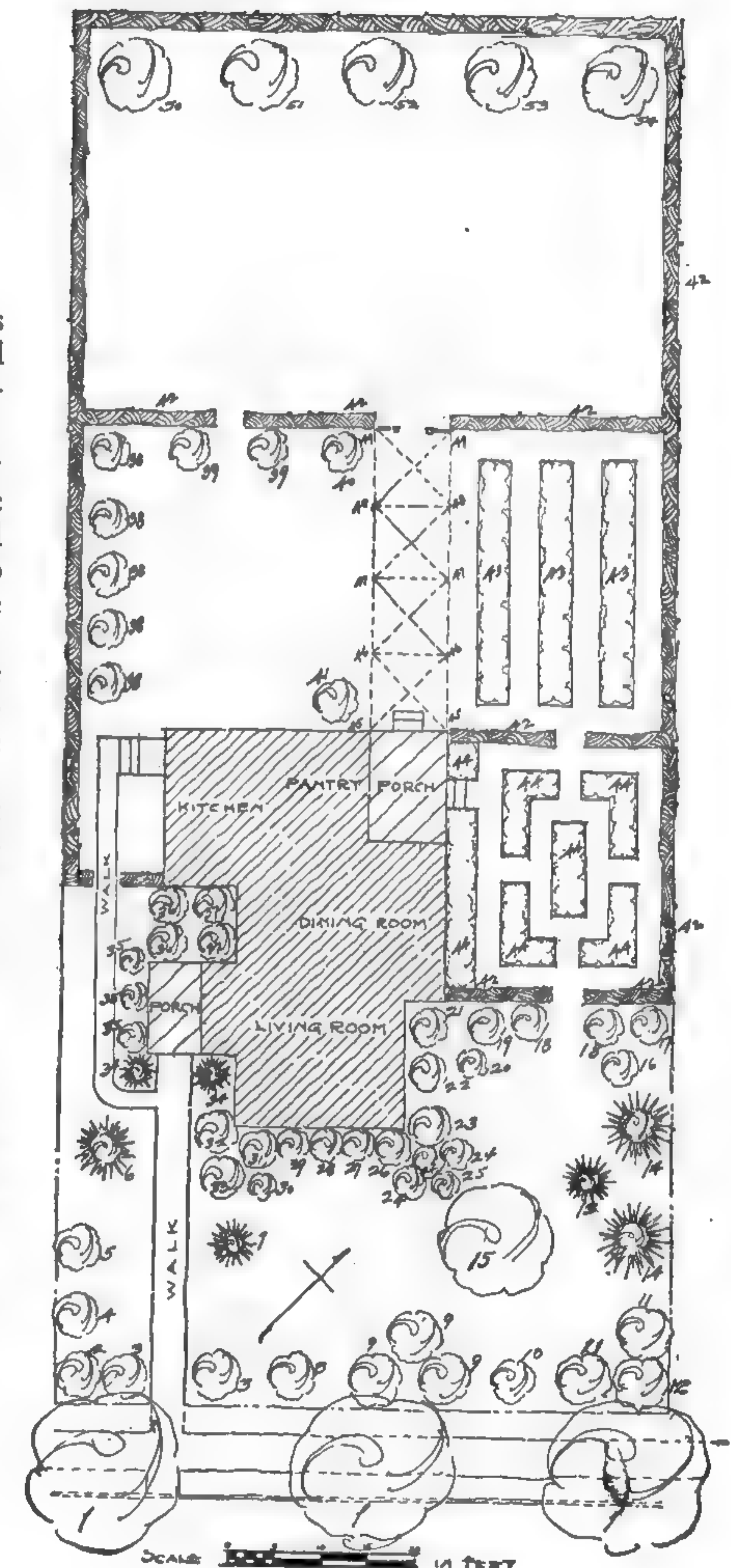
KEY TO PLANTING PLAN NO. 5

Key No.	Quantity	Botanical Name	Common Name
1	3	<i>Ulmus parvifolia</i>	Chinese Elm
2	1	<i>Viburnum rhytidophyllum</i>	Leatherleaf Viburnum
3	2	<i>Azalea amoena</i>	Amoena Azalea
4	1	<i>Ilex serrata</i>	Finetooth Holly
5	1	<i>Amelanchier canadensis</i>	Downy Shadblow
6	1	<i>Abies concolor</i>	White Fir
7	1	<i>Chamaecyparis pisifera</i>	Sawara Retinospora
8	1	<i>Aesculus parviflora</i>	Bottlebrush Buckeye
9	3	<i>Forsythia suspensa fortunei</i>	Fortune Forsythia
10	1	<i>Hydrangea quercifolia</i>	Oakleaf Hydrangea
11	2	<i>Callicarpa purpurea</i>	Chinese Beautyberry
12	1	<i>Viburnum rhytidophyllum</i>	Leatherleaf Viburnum
13	1	<i>Abies nordmanniana</i>	Nordmann Fir
14	2	<i>Pseudotsuga douglasii</i>	Douglas-fir
15	1	<i>Cornus florida rubra</i>	Redflowering Dogwood
16	1	<i>Kolkwitzia amabilis</i>	Beautybush
17	1	<i>Philadelphus Virginal</i>	Mockorange
18	2	<i>Laburnum vulgare</i>	Goldenchain
19	1	<i>Enkianthus campanulatus</i>	Redvein Enkianthus
20	1	<i>Caryopteris incana</i>	Common Bluebeard
21	1	<i>Hibiscus syriacus rubis</i>	Pink Althea
22	1	<i>Spiraea vanhouttei</i>	Vanhoutte Spirea
23	1	<i>Rhododendron roseum elegans</i>	Rhododendron
24	3	<i>Mahonia aquifolia</i>	Oregon Hollygrape
25	1	<i>Azalea hinodegiri</i>	Hinodegiri Azalea
26	1	<i>Cotoneaster divaricata</i>	Spreading Cotoneaster
27	1	<i>Berberis julianae</i>	Wintergreen Barberry
28	1	<i>Berberis sargentiana</i>	Sargent Barberry
29	1	<i>Berberis verruculosa</i>	Warty Barberry
30	1	<i>Azalea Christmas Cheer</i>	Red Azalea
31	1	<i>Cotoneaster francheti</i>	Franchet Cotoneaster
32	1	<i>Rhododendron Parsons Grandiflorum</i>	Pink Rhododendron
33	1	<i>Euonymus patens</i>	Spreading Euonymus
34	2	<i>Thuja George Peabody</i>	Arborvitae
35	3	<i>Deutzia gracilis</i>	Slender Deutzia
36	2	<i>Rhododendron maximum</i>	Rosebay Rhododendron
37	2	<i>Rhododendron catawbiense</i>	Catawba Rhododendron
38	1	<i>Syringa vulgaris Alphonse Lavallee</i>	Lilac
	1	<i>Syringa vulgaris Buffon</i>	Lilac
	1	<i>Syringa vulgaris Charles Joly</i>	Lilac
	1	<i>Syringa vulgaris Charles The Tenth</i>	Lilac
	1	<i>Syringa vulgaris Edith Cavell</i>	Lilac
39	2	<i>Syringa persica</i>	Persian Lilac
40	1	<i>Rhus cotinus</i>	Smoketree
41	1	<i>Chionanthus virginica</i>	White Fringetree
42	550	<i>Ligustrum ovalifolium</i>	California Privet
43	72	Hybrid Tea Roses	
44	150	Perennials and Annuals	
45	2	Concord Grape	
46	2	Niagara Grape	
47	2	Martha Grape	
48	2	Salem Grape	
49	2	Campbell's Early Grape	
50	1	Apple, Delicious, dwarf	
51	1	Pear, Bartlett, dwarf	
52	1	Apple, Wealthy, dwarf	
53	1	Pear, d'Anjou, dwarf	
54	1	Apple, Yellow Transparent, dwarf	

NOTES ON PLAN NO. 5

Planting Plan No. 5 represents an elaborate but exceedingly well organized scheme for the development of a lot 65 ft. by 150 ft.

The property is divided mainly into three areas. The first is the open lawn with rather unusual shrub plantings, both in the group used as base planting around the house and in the specimen shrubs. The second area, which might be termed private, includes the perennial garden, the Rose garden, the Grape arbor and the little lawn or garden living room. This last may be put to several uses—drying yard, informal tea parties and other recreational purposes. It may be attractively furnished with deck chairs and suitable garden furniture. The third area is the vegetable garden, but if the owner does not wish to develop one, this may be converted into a croquet lawn or an additional and more elaborate flower garden. If desired the Rose garden and Grape arbor may be dispensed with and the entire area converted into lawn.



KEY TO PLANTING PLAN NO. 6

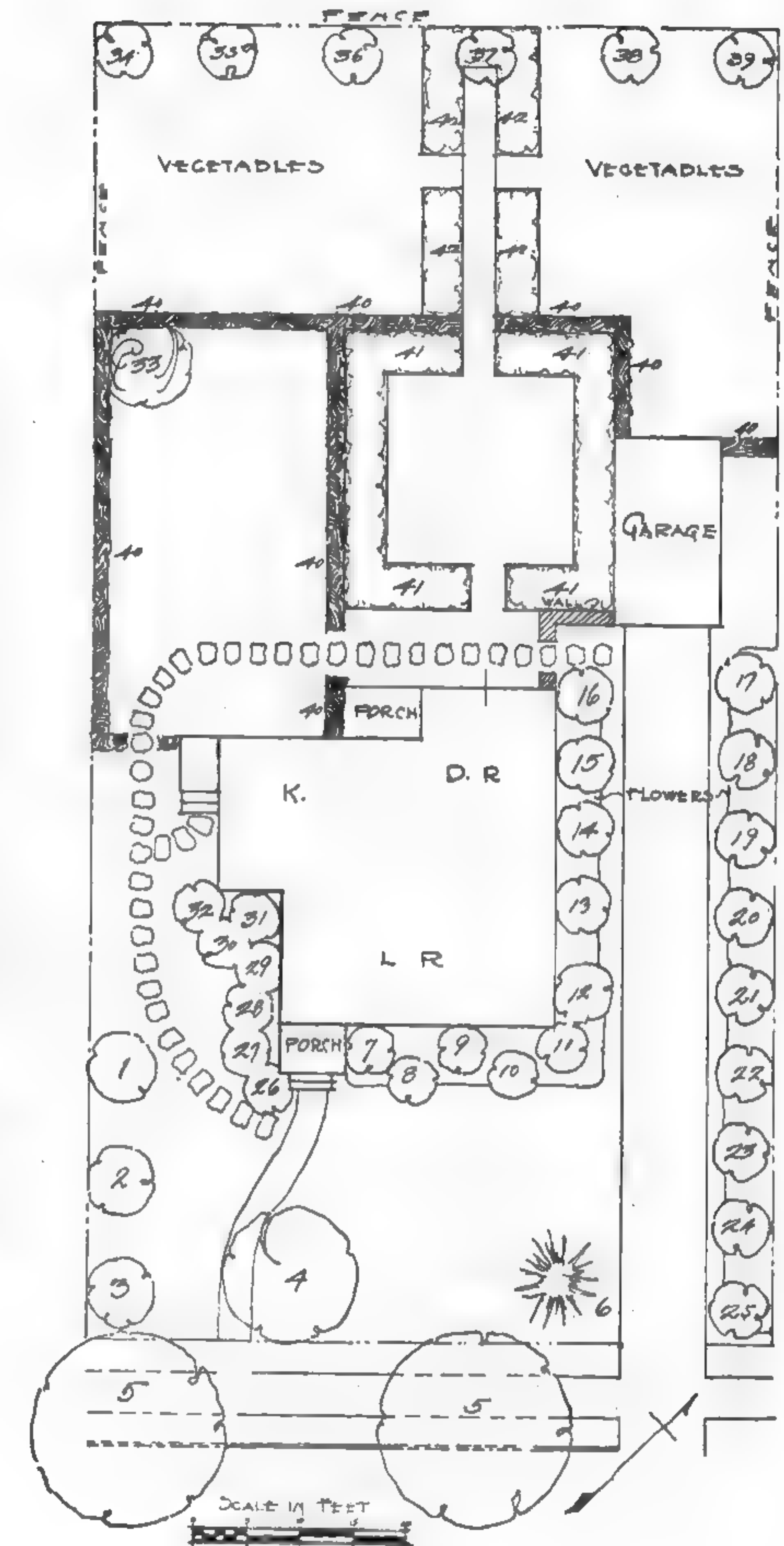
Key No.	Quantity	Botanical Name	Common Name
1	1	<i>Malus ioensis plena</i>	Bechtel Crab
2	1	<i>Crataegus oxyacantha splendens</i>	Paul Double Scarlet Hawthorn
3	1	<i>Hibiscus coelestis</i>	Blue Althea
4	1	<i>Ginkgo biloba</i>	Maidenhair-tree
5	2	<i>Quercus rubra</i>	Red Oak
6	1	<i>Abies concolor</i>	White Fir
7	1	<i>Philadelphus Virginal</i>	Mockorange
8	1	<i>Abelia grandiflora</i>	Glossy Abelia
9	1	<i>Hydrangea paniculata</i>	Panicle Hydrangea
10	1	<i>Kolkwitzia amabilis</i>	Beautybush
11	1	<i>Forsythia fortunei</i>	Fortune Forsythia
12	1	<i>Syringa vulgaris Charles The Tenth</i>	Lilac
13	1	<i>Deutzia lemoinei</i>	Lemoine Deutzia
14	1	<i>Viburnum carlesi</i>	Fragrant Viburnum
15	1	<i>Weigela Eva Rathke</i>	Red Weigela
16	1	<i>Hibiscus single, pink</i>	Althea
17	1	<i>Hibiscus single, white, red eye</i>	Althea
18	1	<i>Rhus cotinus</i>	Smoketree
19	1	<i>Viburnum tomentosum plicatum</i>	Japanese Snowball
20	1	<i>Ilex verticillata</i>	Winterberry
21	1	<i>Callicarpa purpurea</i>	Chinese Beautyberry
22	1	<i>Lonicera morrowi (yellow berried)</i>	Morrow Honeysuckle
23	1	<i>Caragana arborescens</i>	Siberian Pea-tree
24	1	<i>Viburnum tomentosum plicatum</i>	Japanese Snowball
25	1	<i>Viburnum lantana</i>	Wayfaring-tree
26	1	<i>Deutzia gracilis</i>	Slender Deutzia
27	1	<i>Abelia grandiflora</i>	Glossy Abelia
28	1	<i>Philadelphus Avalanche</i>	Mockorange
29	1	<i>Hydrangea paniculata</i>	Panicle Hydrangea
30	1	<i>Deutzia lemoinei</i>	Lemoine Deutzia
31	1	<i>Syringa josikaea</i>	Hungarian Lilac
32	1	<i>Kerria japonica</i>	Single Kerria
33	1	<i>Tilia vulgaris</i>	Linden
34	1	Apple, dwarf	
35	1	Pear, Bartlett, dwarf	
36	1	Pear, Sheldon, dwarf	
37	1	Pear, d'Anjou, dwarf	
38	1	Pear, Howell, dwarf	
39	1	Apple, dwarf	
40	200	<i>Ligustrum amurense</i>	Amur Privet
41	124	Annuals and Perennials	
42		Hybrid Tea Roses	

NOTES ON PLAN NO. 6

This lot of 65 ft. by 125 ft. is arranged very economically and yet should give a most pleasing effect. The wall connecting the garage to the house serves to enclose the little garden, and together with the hedge, separates the utilitarian elements of the scheme from the more ornamental. A gate should be placed in the opening in the wall to add individuality and interest.

While the garden is too small for an elaborate treatment, a square pool could be added in the center with four pots filled with flowers or small shrubs placed on the coping at the corners.

The base planting at the front of the house is deciduous in character. If the owner wishes, a planting composed of evergreens may be substituted.



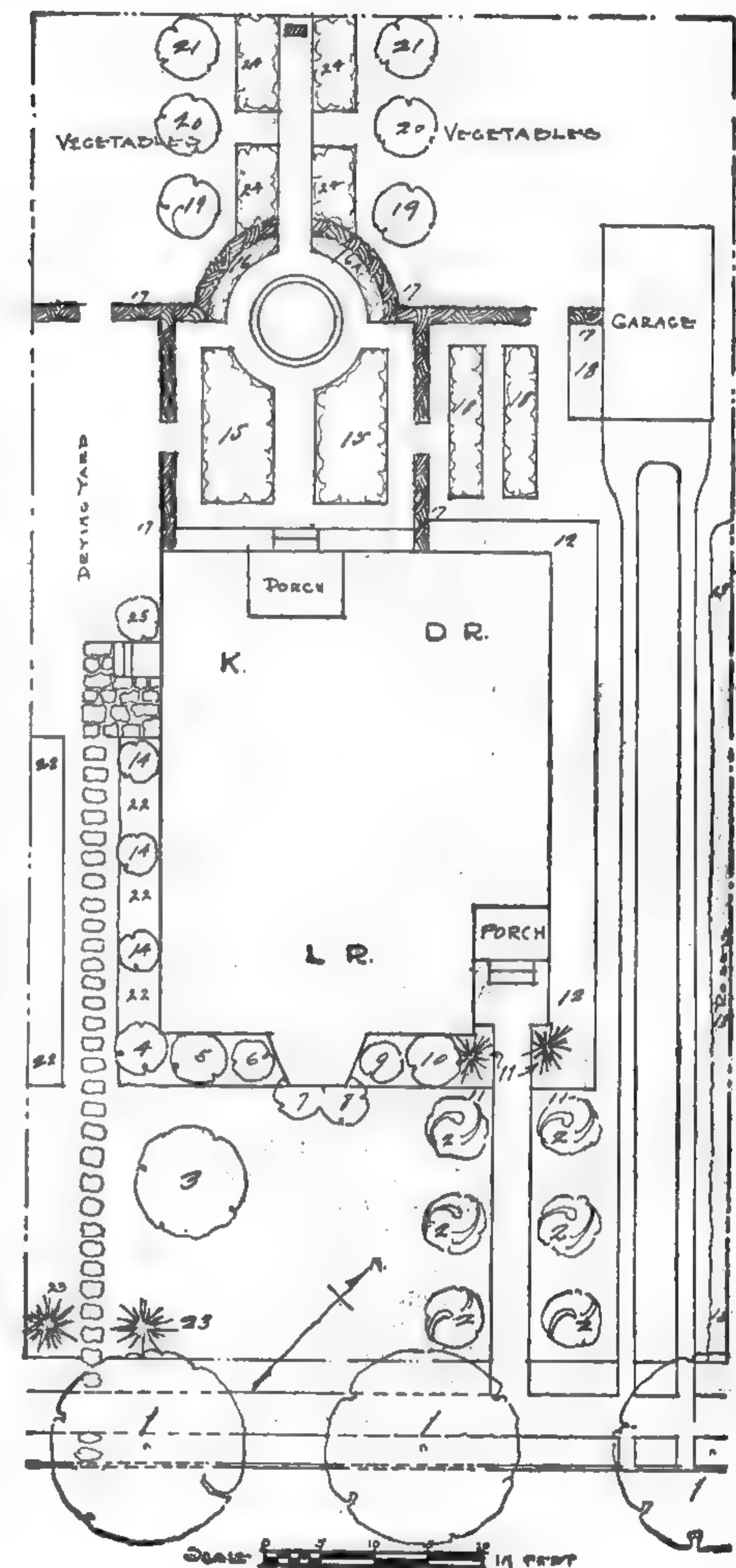
KEY TO PLANTING PLAN NO. 7

Key No.	Quantity	Botanical Name	Common Name
1	3	<i>Acer saccharum</i>	Sugar Maple
2	6	<i>Viburnum rhytidophyllum</i>	Leatherleaf Viburnum
3	1	<i>Prunus Kangan</i>	Japanese Flowering Cherry
4	1	<i>Philadelphus Virginal</i>	Mockorange
5	1	<i>Abelia grandiflora</i>	Glossy Abelia
6	1	<i>Cotoneaster francheti</i>	Franchet Cotoneaster
7	1	<i>Berberis julianae</i>	Wintergreen Barberry
8	1	<i>Berberis sargentiana</i>	Sargent Barberry
9	1	<i>Cotoneaster divaricata</i>	Spreading Cotoneaster
10	1	<i>Abelia grandiflora</i>	Glossy Abelia
11	2	<i>Taxus baccata hibernica</i>	Irish Yew
12	200	Perennials and Annuals	
13	35	Hybrid Tea Roses	
14	3	<i>Syringa Charles The Tenth, Ludwig</i>	
		Spaeth, Marie Legraye	Lilac
15	130	Perennials and Annuals	
16	15	(5 each) <i>Iris germanica</i> Canary Bird	
		Pallida Dalmatica	
		Purple King	
16A	15	(5 each) <i>Iris germanica</i> Ambassadeur	
		El Dorado	
		Lord of June	
17	100	<i>Ligustrum amurense</i>	Amur Privet
18	75	Annuals	
19	2	Pears, 1 Bartlett and 1 d'Anjou	
20	2	Apple, dwarf	
21	2	Peaches, 1 Belle of Georgia and 1 Elberta	
22	50	Perennials and Annuals	
23	2	<i>Pinus montana mughus</i>	Mugho Pine
24	28	Hybrid Tea Roses	
25	1	<i>Hibiscus syriacus rubis</i>	Single Pink Althea

NOTES ON PLAN NO. 7

Plan No. 7 shows a lot 65 ft. by 125 ft. The interesting features are the separate service walk and the definite garden axis from the rear porch. This axis may be terminated by a seat, a figure or a small wall fountain. The circular pool in the garden should be kept quite simple, using a flat stone coping laid almost flush with the ground.

The base planting at the front of the house is partly evergreen but a substitution of coniferous evergreens could be made. The Leatherleaf Viburnum, six of which line the front walk, is a beautiful shrub which is not as well known as its merits deserve.



KEY TO PLANTING PLAN NO. 8

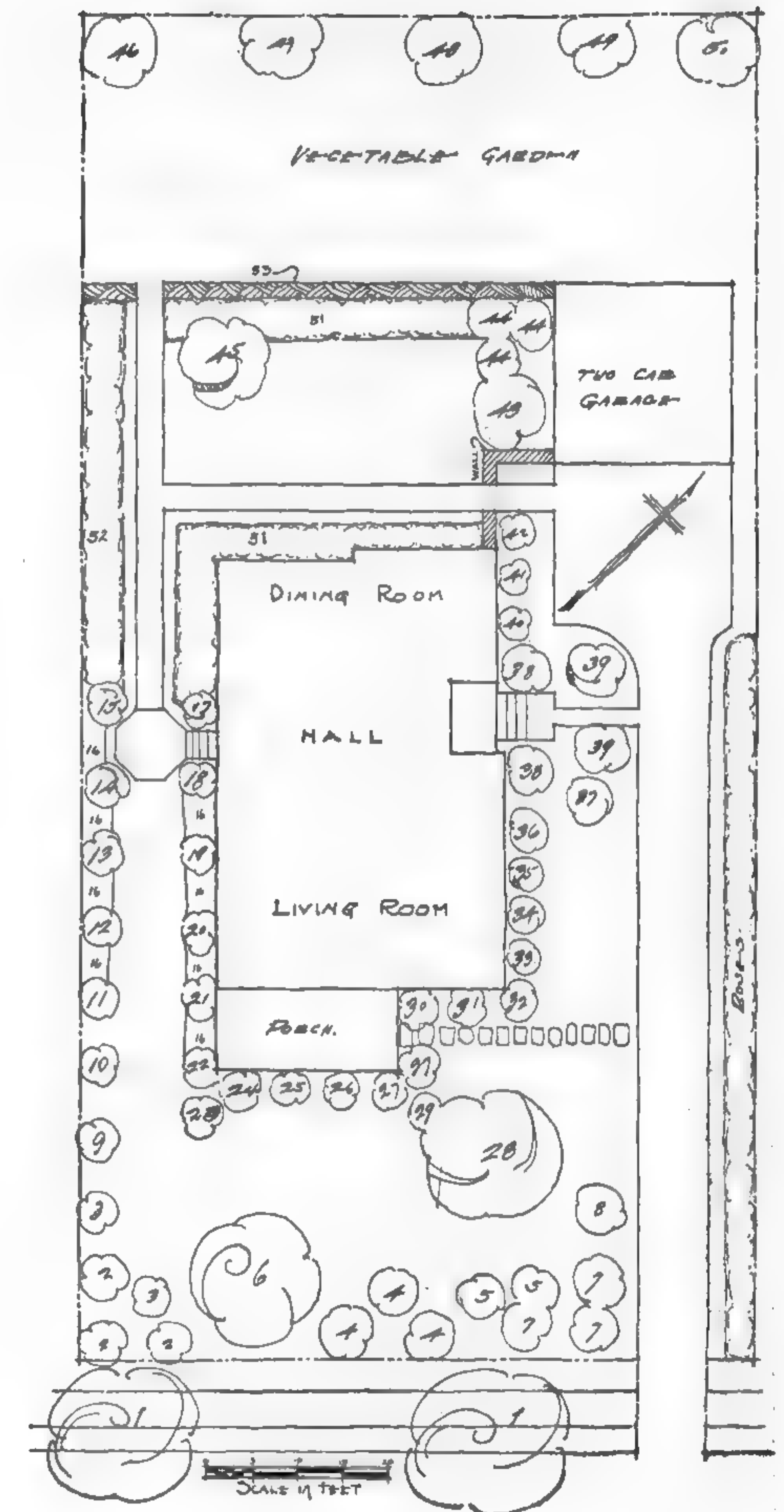
Key No.	Quantity	Botanical Name	Common Name
1	2	<i>Acer saccharum</i>	Sugar Maple
2	3	<i>Viburnum tomentosum</i>	Doublefile Viburnum
3	2	<i>Viburnum carlesi</i>	Fragrant Viburnum
4	3	<i>Ilex verticillata</i>	Winterberry
5	2	<i>Cotoneaster francheti</i>	Franchet Cotoneaster
6	1	<i>Caragana arborescens</i>	Siberian Pea-tree
7	3	<i>Hydrangea paniculata</i>	Panicle Hydrangea
8	1	<i>Magnolia stellata</i>	Star Magnolia
9	1	<i>Deutzia lemoinei</i>	Lemoine Deutzia
10	1	<i>Viburnum lantana</i>	Wayfaring-tree
11	1	<i>Syringa vulgaris Charles The Tenth</i>	Lilac
12	1	<i>Viburnum dilatatum</i>	Linden Viburnum
13	1	<i>Syringa josikaea</i>	Hungarian Lilac
14	1	<i>Viburnum cassinoides</i>	Witcherod
15	1	<i>Syringa vulgaris, Marie Legraye</i>	Lilac
16		Perennials and Annuals	
17	1	<i>Spiraea prunifolia</i>	Bridalwreath
18	1	<i>Kerria japonica</i>	Single Kerria
19	1	<i>Kolkwitzia amabilis</i>	Beautybush
20	1	<i>Hibiscus coelestis</i>	Single Blue Althea
21	1	<i>Rhodotypos kerrioides</i>	Jetbead
22	1	<i>Hydrangea paniculata</i>	Panicle Hydrangea
23	1	<i>Abelia grandiflora</i>	Glossy Abelia
24	1	<i>Ilex glabra</i>	Inkberry
25	1	<i>Berberis laevis</i>	Evergreen Barberry
26	1	<i>Mahonia aquifolium</i>	Oregon Hollygrape
27	2	<i>Berberis triacanthophora</i>	Threespine Barberry
28	1	<i>Ginkgo biloba</i>	Maidenhair-tree
29	1	<i>Abelia grandiflora</i>	Glossy Abelia
30	1	<i>Mahonia bealei</i>	Leatherleaf Hollygrape
31	1	<i>Azalea ledifolia rosea</i>	Sekidera Azalea
32	1	<i>Azalea ledifolia</i>	Snow Azalea
33	1	<i>Osmanthus aquifolium</i>	Holly Osmanthus
34	1	<i>Cotoneaster divaricata</i>	Spreading Cotoneaster
35	1	<i>Mahonia aquifolium</i>	Oregon Hollygrape
36	1	<i>Ilex glabra</i>	Inkberry
37	1	<i>Azalea hinodegiri</i>	Hinodegiri Azalea
38	2	<i>Cotoneaster francheti</i>	Franchet Cotoneaster
39	2	<i>Buxus sempervirens suffruticosa</i> (2 ft. by 2 ft.)	Truedwarf Box
40	1	<i>Syringa vulgaris Charles The Tenth</i>	Lilac
41	1	<i>Syringa vulgaris Mme. Lemoine</i>	Lilac
42	1	<i>Syringa vulgaris Ludwig Spaeth</i>	Lilac
43	1	<i>Malus scheideckeri</i>	Scheidecker Crab
44	3	<i>Hibiscus coelestis rubis W. R. Smith</i>	Althea
45	1	<i>Ulmus parvifolia</i>	Chinese Elm
46	1	Apple	
47	1	Pear	
48	1	Windsor Cherry	
49	1	Pear	
50	1	Apple	
51		Perennials and Annuals	
52		Hybrid Tea Roses	
53	75	<i>Ligustrum ovalifolium</i>	California Privet

NOTES ON PLAN NO. 8

Plan No. 8 shows a simple uncrowded arrangement on a lot 75 ft. by 150 ft. The house is entered at two points from walks off the entrance drive which is a distinct saving of space. The two-car garage and the house are connected by a wall similar to the one shown in Plan No. 6, thus insuring privacy to the garden.

The small octagonal area at the foot of the steps leading out from the hall may be of gravel or may be paved in brick or flagstone.

Notice especially the excellent circulation in this plan.



KEY TO PLANTING PLAN NO. 9

Key No.	Quantity	Botanical Name	Common Name
1	1	<i>Quercus rubra</i>	Red Oak
2	1	<i>Liquidambar styraciflua</i>	Sweetgum
3	1	<i>Chionanthus virginica</i>	White Fringetree
4	1	<i>Cornus florida rubra</i>	Redflowering Dogwood
5	1	<i>Forsythia suspensa fortunei</i>	Fortune Forsythia
6	1	<i>Hibiscus syriacus rubis</i>	Single Pink Althea
7	4	<i>Juniperus communis hibernica</i>	Irish Juniper
8	100	Perennials and Annuals assorted	
9	6	<i>Iris pallida dalmatica</i>	Iris
10	7	<i>Chrysanthemum Boston</i>	Chrysanthemum
11	5	<i>Phlox Elizabeth Campbell</i>	Phlox
12	5	<i>Aconitum napellus</i>	Aconite
13	8	<i>Stokesia laevis</i>	Stokesia
14	5	<i>Aquilegia Mrs. Scott Elliott Hybrids</i>	Columbine
15	7	<i>Iris kaempferi</i>	Japanese Iris
16	6	<i>Coreopsis grandiflora</i>	Big Coreopsis
17	1	<i>Chamaecyparis pisifera squarrosa</i>	Moss Retinospora
18	1	<i>Thuja orientalis pyramidalis</i>	Oriental Pyramidal Arborvitae
19	1	<i>Taxus cuspidata</i>	Japanese Yew
20	1	<i>Taxus cuspidata capitata form</i>	Japanese Yew
21	1	<i>Thuja orientalis pyramidalis</i>	Oriental Pyramidal Arborvitae
22	1	<i>Taxus cuspidata</i>	Japanese Yew
23	1	<i>Chamaecyparis pisifera aurea</i>	Golden Sawara Retinospora
24	1	<i>Cotoneaster simonsi</i>	Simons Cotoneaster
25	1	<i>Viburnum tomentosum plicatum</i>	Japanese Snowball
26	1	<i>Weigela rosea</i>	Pink Weigela
27	1	<i>Cydonia japonica</i>	Flowering Quince
28	1	<i>Philadelphus Virginal</i>	Mockorange
29	1	<i>Kolkwitzia amabilis</i>	Beautybush
30	1	<i>Exochorda grandiflora</i>	Pearlbush
31	1	<i>Forsythia fortunei</i>	Fortune Forsythia
32	1	<i>Hibiscus coelestis</i>	Blue Althea
33	1	<i>Laburnum vulgare</i>	Goldenchain
34	1	<i>Deutzia scabra Pride of Rochester</i>	Fuzzy Deutzia
35	1	<i>Hydrangea paniculata</i>	Panicle Hydrangea
36	1	<i>Calycanthus floridus</i>	Sweetshrub
37	1	<i>Spiraea bumalda Anthony Waterer</i>	Anthony Waterer Spirea
38	1	<i>Azalea amoena</i>	Amoena Azalea
39	1	<i>Kerria japonica</i>	Single Kerria
40	2	<i>Deutzia gracilis</i>	Slender Deutzia
41	1	<i>Azalea hinodegiri</i>	Hinodegiri Azalea
42	1	<i>Kerria japonica</i>	Single Kerria
43		Perennials and Annuals	
44		Hybrid Tea Roses	
45	1	Apple, Grimes Golden	
46	1	Apple, Smokehouse	
47	1	Pear	
48	1	Pear	
49	1	Pear	
50	1	Pear	
51	1	Apple, Stayman Winesap	
52	1	Apple, Northern Spy	
53	350	<i>Ligustrum amurense</i>	Amur Privet

NOTES ON PLAN NO. 9

This plan, showing a lot 65 ft. by 125 ft., presents a thoroughly formalized scheme to the home owner who prefers to obtain from his acreage the maximum in flower bed area and enclosed "garden living rooms" rather than a lawn.

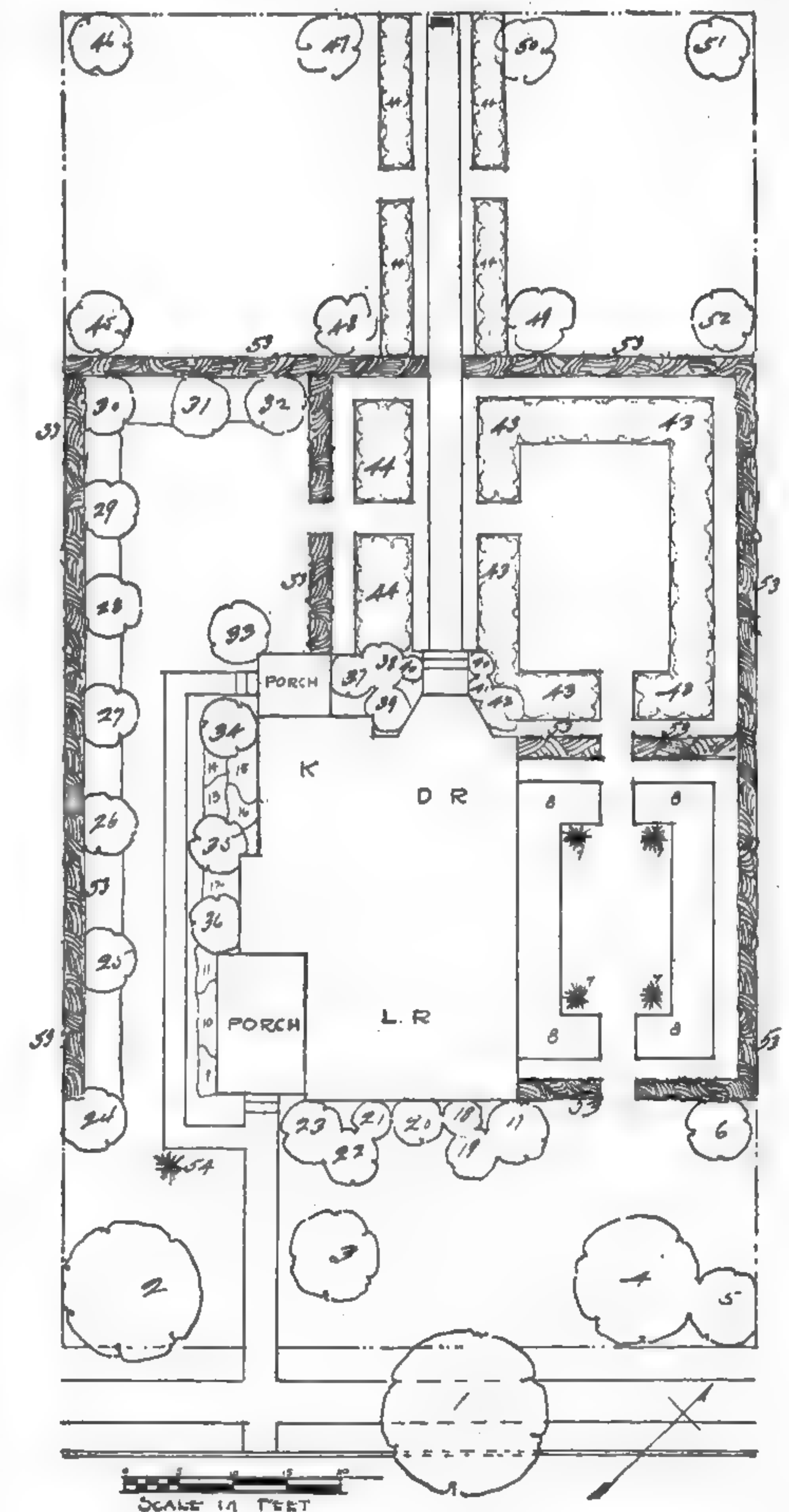
The living room and dining room overlook the first garden where an interesting shrub or winter garden might be maintained. This could also be the Spring bulb and annual garden. Through this the perennial garden is reached which leads one to the long vista from the dining room door to a feature of some sort at the rear property line. This walk might be flanked by borders of Rose bushes where it passes between the two units of vegetable garden which are provided.

The kitchen porch opens on to a small lawn which may be converted into a drying yard by the addition of a collapsible clothes dryer. The service walk, which connects the front path with the kitchen door, will prove to be a practical convenience.

A difference in level in this property would add interest to the scheme, but it would also add to the expense as masonry walls and steps require skilled labor.

The amount of hedge material used in this development may seem excessive to the casual observer. The hedges do however, insure privacy, and if they are of some fast growing and inexpensive material such as Privet, they can be clipped and trained to be well worth while.

It will be noticed that the circulation around the property is excellent from both a practical and an aesthetic viewpoint. One may go from lawn to garden to vista and back to lawn and always find the view pleasing.



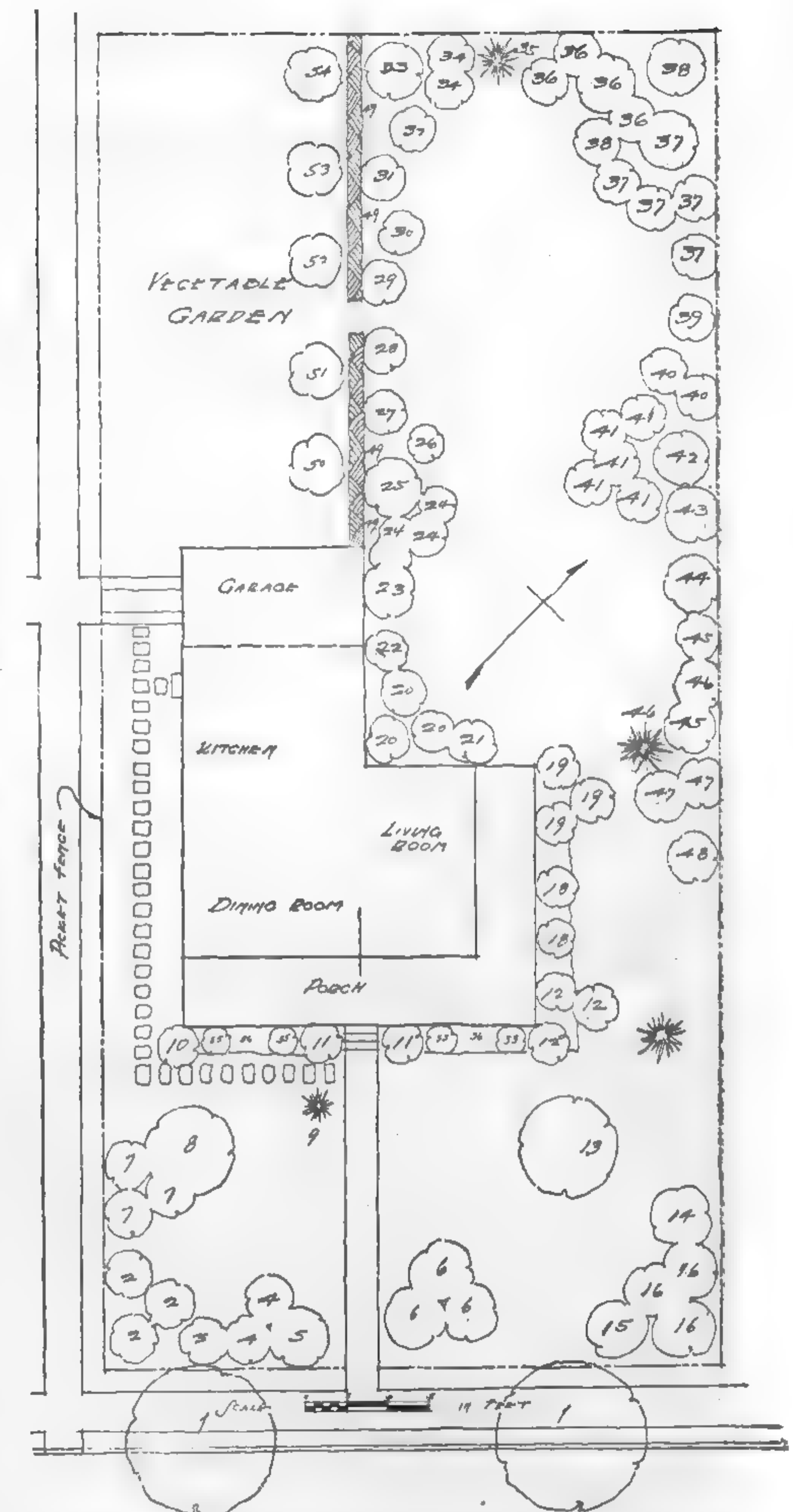
KEY TO PLANTING PLAN NO. 10

Key No.	Quantity	Botanical Name	Common Name
1	2	Ulmus parvifolia	Chinese Elm
2	3	Viburnum lentago	Nannyberry
3	1	Viburnum tomentosum	Doublefile Viburnum
4	2	Forsythia suspensa fortunei	Fortune Forsythia
5	1	Cornus kousa	Kousa Dogwood
6	3	Viburnum carlesi	Fragrant Viburnum
7	3	Hydrangea quercifolia	Oakleaf Hydrangea
8	1	Prunus sieboldi	Siebold Cherry
9	1	Taxus cuspidata (capitate form)	Japanese Yew
10	1	Azalea hinodegiri	Hinodegiri Azalea
11	2	Azalea ledifolia rosea	Sekidera Azalea
12	3	Abelia grandiflora	Glossy Abelia
13	1	Malus ioensis	Prairie Crab
14	1	Prunus triloba	Flowering Plum
15	1	Weigela Eva Rathke	Red Weigela
16	3	Spiraea vanhouttei	Vanhoutte Spirea
17	1	Tsuga canadensis	Canada Hemlock
18	2	Kerria japonica	Single Kerria
19	3	Spiraea bumalda Anthony Waterer	Anthony Waterer Spirea
20	3	Philadelphus Virginal	Mockorange
21	1	Clethra alnifolia	Summersweet
22	1	Vitex agnus-castus	Lilac Chaste-tree
23	1	Crataegus oxyacantha splendens	Paul Double Scarlet Hawthorn
24	4	Cydonia japonica	Flowering Quince
25	1	Rhus cotinus	Smoketree
26	1	Berberis vulgaris atropurpurea	Purple Barberry
27	1	Viburnum tomentosum plicatum	Japanese Snowball
28	1	Hibiscus Carnation Stripe	Shrub-althea
29	1	Hibiscus Lady Stanley	Shrub-althea
30	1	Chionanthus virginica	White Fringetree
31	1	Cercis canadensis	American Redbud
32	1	Rhus cotinus	Smoketree
33	1	Cornus florida	Flowering Dogwood
34	2	Viburnum dilatatum	Linden Viburnum
35	1	Pinus nigra	Austrian Pine
36	4	Forsythia intermedia	Border Forsythia
37	4	Exochorda grandiflora	Pearlbush
38	1	Cornus florida rubra	Redflowering Dogwood
39	1	Lonicera morrowi	Morrow Honeysuckle
40	2	Vitex macrophylla	Chaste-tree
41	5	Deutzia lemoinei	Lemoine Deutzia
42	1	Viburnum lentago	Nannyberry
43	1	Sorbus aucuparia	European Mountain-ash
44	1	Cotoneaster simonsi	Simons Cotoneaster
45	3	Syringa Ludwig Spaeth, Charles The Tenth and Mme. Lemoine	
46	1	Abies concolor	White Fir
47	2	Weigela rosea	Pink Weigela
48	1	Rhus cotinus	Smoketree
49	87	Ligustrum ovalifolium	California Privet
50	1	Apple	
51	1	Pear	
52	1	Pear	
53	1	Apple	
54	1	Cherry	
55	4	Azalea ledifolia	Snow Azalea
56	24	Vinca alpina	Periwinkle

NOTES ON PLAN NO. 10

Plan No. 10 shows a well planned arrangement for a corner lot, 75 ft. by 170 ft. One of the best features is the location of the garage and service entrance on the side street where they do not interfere with the living parts of the house.

The lawn opposite the vegetable garden could easily be converted into a flower garden by the addition of a hedge running across the lot from the garage corner and continued along the property line.



For a complete work on the subject of this
chapter we recommend

PRACTICAL LANDSCAPE GARDENING, by ROBERT B. CRIDLAND

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Chapter II

HEDGES AND FENCES

By ALFRED CARL HOTTES

Hedges of Privet—Barberry—Coral Dogwood—Box—Yew—
Holly—Buckthorn—Hawthorn—Hemlock—Arborvitae and
Norway Spruce—Location—Soil—Fences with Climbers

MUCH has been said of late regarding the wholesale manner in which fashion has dictated that every sort of fence and boundary should be removed. The word "garden" carries with it the meaning of enclosure. We in America are again desiring more and more to have our own dooryards to ourselves. It is pleasant to know



Privet put to good use in charming city street arrangement

where our province leaves off and the next begins. Marauders have full sweep. There is something home-like about an enclosure with some degree of privacy. Because the city is abolishing every means for such privacy we wish at times to be by ourselves, and the country is chosen. Hedges or boundaries need not be emphasized, but let us not fear to put up some little shrubbery to shield us from the public gaze, and let us enclose parts of our own domain by a low hedge. Formidable fences are not advocated, but private areas bounded by hedges are always interesting.

Low hedges of the graceful Regel Privet (*Ligustrum regelianum*) are very handsome; or *Berberis thunbergi*, with its red berries and Fall coloring; or the Coral Dogwood (*Cornus alba sibirica*). For an ever-green hedge, nothing has been used more than Box. This is not hardy in all parts of the North, and is a very slow grower. For starting the hedge, old plants may be broken apart and set out. The Dwarf Japanese Yew (*Taxus cuspidata* var. *brevifolia*) is very hardy but has hardly become known as yet in American gardens. The Littleleaf Holly (*Ilex crenata microphylla*) can also be used.

Taller hedges are best made of the Ibota (*Ligustrum ibota*), Common Privet (*Ligustrum vulgare*), or the California Privet (*Ligustrum ovalifolium*). The California Privet is seen at its best in the Eastern coastal states, from Maine south, and succeeds admirably from the very edge of the beach up to ten miles inland, where it is one of the best materials to use, but in many inland northern localities it freezes to the ground every few years so that the character of the hedge is destroyed. The Golden Privet is very bright and cherry and useful. The sort known as the Vicary Privet is more golden. The Buckthorn (*Rhamnus cathartica*) is a useful and not easily penetrable hedge. The Cockspur Thorn (*Crataegus crus-galli*) and the English Hawthorn (*C. oxyacantha*) are also useful. They will require close pruning when small to induce branches at the base of the plants. The Cockspur Thorn, on account of its dangerous, needle-like thorns, should not be set out where there is a sidewalk. Hedges of Hemlock, Arborvitae and Norway Spruce are substantial when the taller ones are wanted. The Hemlock is the finest, since each plant merges into the next admirably.

A common blunder with hedges is to locate them too near walks so that they are injured by the constant brushing against them by the passersby. When you discover this, it is generally possible to transplant the hedge if it is cut back severely.



Hemlock (*Tsuga canadensis*) makes an imposing hedge, yet the greenery is soft and pleasing

The soil should be prepared deeply and well as for ordinary shrub planting. The practice is not advised of placing two rows of shrubs for a hedge. The hedge can be kept cleaner of weeds and its growth is more symmetrical by planting only one row. It is advisable in setting a hedge to set the plants so that they touch at planting time. This means that the smaller plants, as Barberry, will be planted six to eight inches, and Privets ten to twelve inches apart. The soil must be thoroughly firmed around the plants at setting.

For pruning hedges, see chapter on Pruning.

Board or picket fences are employed between the smaller suburban yards. These can be covered with Rambler Roses, Honeysuckle in variety, or other climbers. By proper pruning and thinning these will not get too heavy or cumbersome, and can readily be held back if the fence requires to be painted. Iron fences and galvanized or aluminum painted fences are also used, the latter being strong and durable. Or again, a soil bank can be thrown up and be planted with trees and shrubs. The consideration of brick and stone walls hardly comes within the scope of this book.



Chapter III

HOW TO MAKE A SUCCESSFUL LAWN

By HARRY R. O'BRIEN

Making a New Lawn—Seed—Seed Sowing—Care of Established Lawns—Compost—Rolling—Cutting—Watering—Weeds—Bent Grass—Sodding

THE lawn furnishes the setting for a house, and if it is trim, smooth, and of a healthy green, it will add the finishing touch to an attractive home which no amount of planting can give. Wide-spreading slopes or level terraces of turf are the outdoor delight of many homes, from the humblest cottages to the largest mansions. Neat lawns are ever the sign of a family that is thrifty and home loving.



Lawns like this do not come by chance

But a good lawn does not come by chance nor flourish when neglected. It takes just as much intelligent preparation and constant vigilance and care as does the flower garden, the shrubbery or vegetable garden. Making and caring for a lawn is an art in itself, one that we are just coming to understand in America, and one that is made easier by the materials and tools that have come on the market in recent years. Many new facts have been discovered, too, in recent years by experimental work and from golf course experience.

The first principle to be followed in acquiring a beautiful lawn is to plan it so that the surface will not be cut up by meaningless and inappropriate beds. Such beds, in large lawns, sometimes detract from the feeling of repose, and in small lawns they make any artistic landscape treatment difficult. Also, trees and shrubs, which are arranged haphazardly and thickly about a lawn, are objectionable. Many a home yard is utterly spoiled by this spotty appearance. The lawn should be thought of as a feature by itself, as a unit of beauty, and the trees, shrubs and flowers should be arranged along the margins as far as possible. In some cases, no better effect can be gained than by allowing the cool, green lawn in places to run directly up to the bricks or brown stone houses.

MAKING A NEW LAWN

Establishing a new lawn begins when the foundation of the house is being dug. The top soil should be piled off to one side. When the grading of the lawn is begun, the top soil should be scraped to one side also. The grade itself should slope away from the house to insure drainage and terraces should be avoided. If the subsoil is a heavy, impervious clay, drain tile should be laid down, with lines of 4-inch tile spaced 20 to 30 ft. apart and laid 2 to 2½ in. deep, with a fall of about 3 in. for each 50 ft. After grading, the top soil should be replaced, and, if insufficient, additional good loam should be added so that this is at least 2 in. thick.

An ideal way to make a lawn is to do the grading in the Spring and then keep cultivating the ground during the Summer to kill the weeds. Even better, sow the ground to a legume crop, such as Soybeans, Clover or Cowpeas, or a mixture of one of these and Oats; then plow this crop under in late Summer to provide humus. This is practicable only on large spaces, however.

If this method is not followed, then disk into the soil some humus material. Well rotted manure, more free from weed seeds than fresh

manure, at the rate of 500 pounds to the thousand square feet, or with the ground covered about three inches, is excellent. If this is not available, use peatmoss, covering the ground with an inch of peat, then disking it in. However, if the surface of the soil is good, it may not be necessary to add humus.

The surface of the soil should be pulverized and raked as smoothly as possible, with all kinds of debris, as roots and stones, removed. If seed sowing is to be done at once, the ground should first be thoroughly rolled after smoothing, then loosened with a steel rake. It is much better, however, to let a few soaking rains fall before sowing, for these rains will settle the soil and show up places that are not level, so they can be filled up. After the rains, the soil should again be loosened just before sowing.

In addition to humus, commercial fertilizer should be applied to a new lawn before seeding. Any of the advertised brands of garden and lawn plant food will be acceptable, but those in which the elements of phosphorus are as much or more than the nitrogen and potash combined are best for new lawns. So a 4-12-4, a 5-10-4 or the equivalent, will be best. If no manure has been used, apply about 20 to 25 pounds of a 4-12-4 or equivalent, or if manure has been applied, use about 15 pounds of this formula. In using any brand, however, you can best be guided by following the recommendations of the manufacturer. Both manure and fertilizer should be applied several days before seeding. Fertilizer should be raked into the ground.

SEED

It is not possible here to give a set formula for a lawn grass seed mixture because conditions vary in different parts of the country. It is essential that the best seed available be bought. Buy from your most responsible local seed house and read the label on the package, which, according to law in most states, will give you the correct analysis of the constituents, including percentage of weed seed. Also obtain, if possible, the recommendations of your state agricultural college. Remember, too, in buying, that a different mixture is used on a shady lawn from one suitable for a lawn in the sun.

Practically all good grass seeds you buy will be a mixture of several kinds of grasses, for by sowing such a mixture, a good, thick turf is most easily and quickly established. Some of the grasses are quick growing but will die out, while meanwhile the slower growing types are coming on to take their place. Also, some are shallow rooting



Keep the center of the lawn free from beds or plantings

and utilize the top soil, while others are deeper rooting and will tap food resources deeper down.

In most sections of the country, except in the South, the chief ingredient of a good lawn is Kentucky Bluegrass. The amounts of this and the other grasses combined with it vary in different sections. The Ohio recommendation is four parts Kentucky Bluegrass; the Minnesota directions are to use six parts Bluegrass. In South Carolina the Bluegrass is combined with Bermuda grass. In New Jersey, Bentgrass is included in the recommended mixture. In Florida, lawns are made of such grasses as St. Augustine Grass, Bermuda Grass and Centipede Grass, with Italian Ryegrass sown annually for a Winter lawn. These variations illustrate the necessity of using local seed mixtures recommended.

SEED SOWING

The best time to make a lawn in all sections of the country, except the lower South and extreme North or mountain regions, is in early Fall from late August up to the first of October. Grass likes cool, damp weather to do its best, and if sown at this time, it will get a sufficient start to carry it through the Winter. The second best time

is in early Spring, as soon as the ground can be worked satisfactorily. Spring sowing has one handicap, however, and that is the grass must compete with weeds all Summer.

Seed is best sown on a still day so that the wind will not scatter it about. It may be sown by hand, but it is more preferable to use a distributor. There is a small plant food distributor on the market that can be used for sowing grass seed. With either hand or distributor sowing, use half of your seed to sow in one direction, and then the other half to sow in a crosswise direction, to insure evenness of distribution.

After seeding, rake the surface gently with a steel garden rake in two directions or drag with a piece of cloth or burlap sack fastened to a four-foot board. Then, unless a rain is imminent, water the lawn gently with a fine spray. After the surface has dried sufficiently, roll with a light roller. When the grass is about three inches tall, give it its first clipping, with the mower blades set high. Mow thereafter about once a week, but do not cut closely while the grass is young.

CARE OF ESTABLISHED LAWNS

The first principle in maintenance of a lawn already established is proper fertilization. Formerly lawns were often given a top dressing of rotted manure in Winter, but this is unsightly and brings weeds. If any Winter mulch is desired, a coating of a half-inch or more of peatmoss will better supply the needed humus and be weed free. Then in Spring, usually in late March or April, give the lawn an application of a commercial plant food.

The best recommendation as to the kind of fertilizer to apply on an established lawn is to use one in which the amount of units of nitrogen is equal to the units of phosphorus and potash combined. Thus, a 10-6-4 or an 8-5-3 formula conforms to this rule of thumb. Any garden fertilizer, such as a 4-12-4 or a 5-10-4, however, can be used, but a larger amount will be needed in order to get sufficient nitrogen. While it is best to follow the recommendation of the manufacturer, about 10 pounds of a 10-6-4, 12 to 15 pounds of an 8-5-3 or 20 to 25 pounds of a 4-12-4 formula to each 1000 square feet of lawn will be fairly good practice. Put it on either during a brisk shower or else when the grass is dry; rake the lawn with a brume rake to brush it down and then water it in thoroughly at once. This is to prevent burning the grass. In case any of the more highly concen-

trated plant foods are used, the safest way is to dissolve the material in water according to directions and apply by sprinkling.

To keep the lawn in good condition, two more applications of commercial plant food should be given it later in the season, some time in June and again about August. About half the amount used in the Spring will usually be sufficient for each application. If the lawn has been well handled previously and is in vigorous condition, these two later applications might be of nitrogenous material only, with sulphate of ammonia the first recommendation, though nitrate of soda can also be used. Use about 20 pounds to each 1000 square feet.

HUMUS AND COMPOST

It is advisable to add organic matter to the lawn from time to time. As already stated, this can be applied late in the Fall or during Winter by use of well rotted barnyard manure or peatmoss. If one has a good compost pile, material from that can be used. It is often advisable to add humus of some kind in the Spring. A mixture of good loam and peatmoss, about half and half, can be scattered evenly over the lawn before rolling. Just the scattering of good loam itself will be quite beneficial. If the lawn has not been kept up well previously, it will sometimes be beneficial to give a light dressing of this compost once or twice more during the Summer.

ROLLING

During the Winter the alternate freezing and thawing causes the ground to heave and become irregular. To get rid of this, the ground should be well rolled in early Spring. This should be done at just the right time, when the ground is dry enough to be trod upon and before it is has dried out so much that rolling will not smooth down the surface. Additional rolling during the Summer, especially on newer lawns, is worth while, though not so important.

CUTTING

Grass should never be allowed to get more than three inches high. It should be mowed often and not too low. This means at least once a week and sometimes oftener during the fastest growing periods. Grass clippings should always be left on the lawn, unless after mowing when the grass is unusually high. The clippings will sink down and rot to form humus that protects the roots. If after mowing, the lawn is brushed with a brume rake, the clippings will sift down more

readily. Authorities differ as to how long mowing should be continued in the Fall. The best advice seems to be that it should be kept up fairly late and as long as the grass continues to grow vigorously.

Cutting it is best done in the morning or in the evening, when the grass is more tender. Each cutting should be in different direction to the way previously cut. If the mower runs north and south one time, run it east and west the next. On large lawns, an occasional mowing in a diagonal direction will be helpful. Always mow straight back and forth. Do not attempt to turn corners and mow around the four sides of a block of lawn at once. Once or twice a season take the mower to an experienced repair man for sharpening and adjustment.

WATERING

Except in the lower South and extremely dry sections, watering is seldom necessary and often more harm is done a lawn by watering than not. Even if the grass turns brown in Midsummer, no damage is done, for the first good rain will bring it back to green growth again. If watering is done, soak the lawn thoroughly and then leave



Lawns should slope away from the house

it alone for a week or 10 days, rather than giving a light sprinkling every day. If the fertility program recommended above is carried out, the grass will stay green longer and will more quickly recover after a rain. Incidentally, a well nourished lawn will recover more quickly from insect or grub injury.

WEEDS

Weeds in the lawn probably cause more worry to the average home owner than any other matter connected with the lawn. There are a number of special tools now available for digging out weeds. New chemical sprays have come on the market in recent years which if used for several applications will kill out most weeds without doing any material damage to the grass. However, the most important secret of weed control has already been given above. If a lawn is fertilized well, if it is given humus and the mower is kept going, the grass will grow so vigorously that a thick sod will be formed, practically killing all weeds by smothering. The thick sod will prevent seeds that alight from germinating. Even Dandelions and Dock will in two or three years succumb to the energy of well-fed Bluegrass. So, for temporary and quick weed control, dig and spray. For permanent control, keep fertilizing and mowing.

BENTGRASS

In recent years the use of Bentgrass on putting greens of golf courses has turned the attention of home owners to this for lawns. A Bentgrass is beautiful when handled right. It demands especially careful preparation of the soil, however, and the correct methods must be used in establishing it. It also demands more care than a Bluegrass lawn and must be mowed more frequently. Bentgrass can be established either by planting of stolons or by sowing seed.

Bentgrass will succeed only in the upper two-thirds of the country and will not do in the Southern States. It is especially suitable for the Atlantic Coast States from New Jersey north, where the soil is quite acid, for such a condition is what it demands.

Anyone wishing a Bentgrass lawn should secure specific directions for establishment from dealers in stolons or seeds, since these are too detailed to include here. There are various Bentgrasses on the market, but their names are not well settled yet and even the botanists are still in doubt. The best way is to accept the recommendation of a reliable dealer, preferably one in your general section of country.

SODDING

It is seldom advisable to establish a lawn by sodding or turfing, for after the first four or five weeks, a lawn sown from seed will be better than a sodded one. However, when it is necessary to use sod, the soil should be prepared in the same careful manner as for seeding. The newly laid sod should be well firmed and watered so that the grass roots are immediately encouraged to start growth into the soil below.

*For a complete work on the subject of this
chapter we recommend*

THE LAWN, by LAWRENCE S. DICKINSON. Secure this book where
you bought your Garden Guide



Chapter IV

PLANTING HILLSIDES AND TERRACE SLOPES

By FRANZ A. AUST

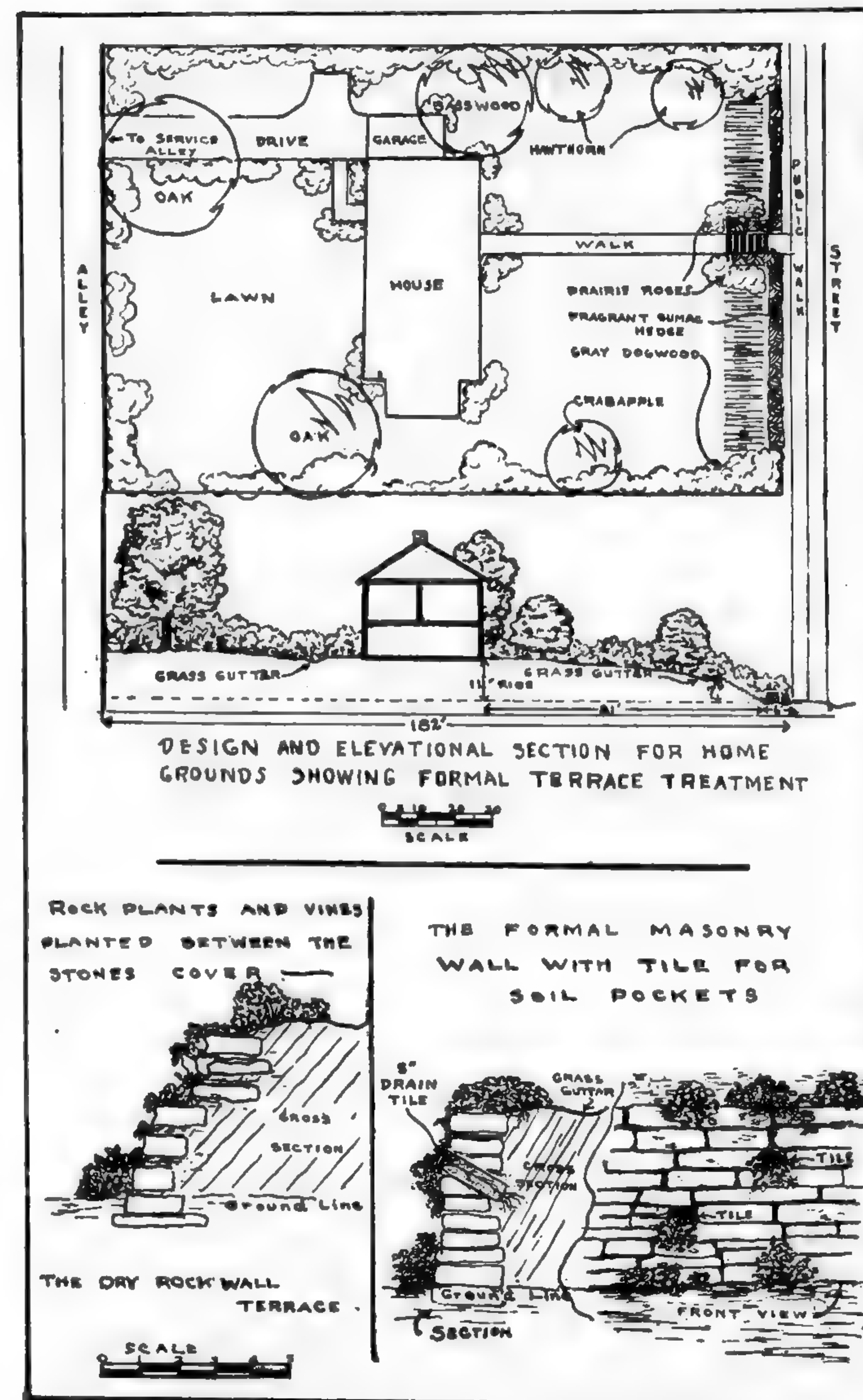
Ground Construction and a Setting for the House—Ground Terraces—Walls to Hold the Terrace—Drainage—Grasses for the Terrace Slope—Shrub Plantings—Ground Covers—A Garden in the Wall—Rock Garden as a Terrace Feature—Purpose of Planting the Hillside or Terrace Slope

A HOME on a hill has an appeal for most people and it offers possibilities in planning and planting that cannot be developed on flat areas. But the hillside or terrace that occurs in such a place is difficult to maintain when it is not done well—and it is still more difficult to look at. It will help in the appeal of the place if the slope does not appear too steep, for there is something about such a slope that spoils the feeling it gives to the eye. The inherent laziness of the human race objects to climbing uninteresting mountains, even for the distant view, and the attractiveness of the home will be greatly enhanced by a proper setting and use of special plant materials.

GROUND CONSTRUCTION AND A SETTING FOR THE HOUSE

A particular home grounds may have a rise from 3 to 10 ft. above the level of the public walk, to be built in one or two terraces. Where the grounds are located on a steep hillside, the treatment will have to be somewhat different of course, but the general principles for ground construction and plant materials will be the same, the difference being mainly in the more careful provision for drainage and wash of soil, and the use of larger masses (more of one kind of shrub or tree plantings in one group).

The ground should be fairly level for at least 8 ft. out from the foundations of the house. This seems to give a base for the house to rest upon, and satisfies the eye that there is no danger of the house toppling over, and is not stuck up on a mound of excavated earth. In no case should the slope of the terrace start directly from the foundations of the house. Nor should the base of a terrace or wall crowd the public walk. It is well to keep the foot of the terrace back



Form of construction for slope and terrace. The house should have a proper setting on slopes

at least 2 ft. from the walk, and if there is to be a hedge or other planting, 6 ft. is better. This will provide for a dirt deposit at the bottom of the slope other than on the public walk, and in Winter for the deposit of snow, both from the slope and from shoveling the walk. Drainage about the house and the wash of excess water over the slope must be taken care of. Wherever possible the ground construction should be planned before the home is built, and the buildings, drive, and steps located suitably with due regard for the planting treatment. For, while plantings can do much toward creating and maintaining the setting for the home, it is impossible to do certain things. "It is better," said Aristotle "to work with Nature rather than against Nature." One may just as well work with Nature in grading and building the lawn, for if a bank is made too steep it will slowly wash down to a gradual slope anyway.

GROUND TERRACES

In all ground construction there are geological laws of Nature that can be practically applied. The physical structure of soil is one; light soil cannot be successfully terraced while heavier soil may be to an extent. For convenience, it may be well to state that in engineering terms related to grades the greater number is always the horizontal distance, and the smaller the vertical distance. Heavier soil may be terraced in a grass slope, but seldom beyond a 1 to $1\frac{1}{2}$ or 1 to 2 slope. Where there are 40 or 50 ft. between the street and house, the rise 6 to 8 ft. and the soil heavy loam or clay loam, a gentle ground slope terrace with shrub plantings to retain it will usually be found satisfactory.

WALLS TO HOLD THE TERRACE

If the soil is light sand or very light sandy loam, it is better to build a breast rock wall where the terrace ends, and plant rock plants in the pockets. Where the space between walk and house is short (less than 20 ft.) and the rise more than 4 ft.; it is better to use a breast wall or a retaining wall at the sidewalk and keep the entire lawn above the street. A breast wall merely keeps the ground in its natural position. A retaining wall where earth is filled in beyond the original ground level, or where the slope rises higher behind the wall, needs to be stronger than a breast wall. Walls should be set at a slight incline angle sloping with the bank, should be wider through at the base than at the top, and should have a masonry foundation to rest

upon. The use of long stones to anchor back into the ground is also necessary to prevent bulging and cracking of the wall. The dry rock wall—that is one laid up of stone without mortar—should be sloped back about 1 ft. horizontally for each additional 3 ft. of vertical rise. In such treatment the use of native stone is best, to relate the rock work with any natural forms that may be in the surrounding landscape. Flat stone is best for such work, as it can be more easily built up. A dry rock wall is good in most cases, and has the advantage that it can be planted with rock plants, but the kind of soil, and also the type of architecture in the house may influence the type of retaining wall to be built. For instance, with a brick house, a brick retaining wall might well be used. Formal masonry walls are often appropriately used in terrace construction, especially if the house is of stone. The same type of stone as that used in the house, or in the house foundation, should be carried out in the terrace wall, and will bring about a feeling of relatedness between architecture and grounds so necessary for a pleasing composition.

DRAINAGE

Drainage above or behind the terrace slope is an important consideration and an influencing factor on treatment used in any case. Too much water pouring over a slope will cause washing and no amount of cover planting will retain the soil; in this case a wall may be advisable where otherwise a grass slope might be used. When there is much excess water coming down the slope, as might be the case if the lot were at the bottom of a long sloping hill, some provision should be made to carry the water around through paved gutters, or beneath through tile drains, rather than coming over the face of the terrace. If the run-off is very heavy and the soil washes badly, shallow, rounded depressions paved with flat paving stones or flagstones are inconspicuous and efficient in a grass terrace or behind a rock wall.

GRASSES FOR THE TERRACE SLOPE

A smooth, well kept grass terrace with a gentle slope makes a pleasing lawn area. To keep the grass of smooth texture and give the lawn slope a well kept appearance, make certain that you have good, rich soil. The hot, dry, exposed conditions bound to occur on the slope are none too favorable to grass. In northern climates the best to use is the Chewings Fescue which stands drought well, and with its tough stems holds up under rough usage of the lawn mower or the



On gentle slopes a grass terrace makes an attractive lawn area

children's feet. Red Top can also be used and stands considerable drought.

SHRUB PLANTINGS

Some shrub planting should be used with a grass slope to soften the terrace line and relate the levels of the lawn to each other and to the house. Here again, a practical application of Nature gives a suggestion: where an abrupt change in level occurs, the natural break causes a lodging of seeds carried by natural agencies of wind and water, and plants and shrubs grow first near the bottom of the slope. These tend to hold the soil and other seeds, and act as a protection, and finally the slope is clothed. To carry out this natural effect, the larger trees and shrubs would not be directly at the top of the slope, but probably half way up, where the seeds were caught by less permanent growth.

The plantings to be used in the treatment of the terrace slope will be influenced by the type of architecture of the buildings and the

terrace treatment, by the kind of soil, the space and width of each level, and the amount of rise. For a formal, straight line house and terrace, where the walk is straight and near the center of the front lawn, a formal planting could be carried out with a low hedge of clipped Privet, Mountain Currant (*Ribes alpinum*) or Japanese Barberry (*Berberis thunbergii*) at the bottom of the slope. On the slope, a formal balance of forms would be secured by using Crab Apple or Hawthorn trees on each side. Below these trees Gray Dogwood (*Cornus paniculata*) or Downy Viburnum (*Viburnum pubescens*) give a fairly thick growth, the numerous stems and roots serving to hold the earth.

In light, dry soil on a gentle slope Smooth Sumac (*Rhus glabra*) may be used as the larger shrub, and the Downy Viburnum planted beneath.

For northern slope shrubs, Coralberry (*Symphoricarpos vulgaris*) and Common Snowberry (*Symphoricarpos racemosus*) will do well, and are hardy in most places.

The Prairie Rose (*Rosa setigera*) is satisfactory on a southern exposure, but may require Winter protection in colder climates. Wherever hardy the Wichuraiana Roses and Dorothy Perkins Roses can also be used, planted about 3 to 4 ft. apart; there are color varieties to suit many tastes. The dwarf Rock Cotoneaster (*Cotoneaster horizontalis*) is being used both as a ground cover plant and for its color; the flowers are pinkish-white and in Autumn the fruit berries are bright red. Fragrant Sumac (*Rhus canadensis*) is especially adapted to the Lake Michigan region, and is most attractive when its tumbling branches are allowed to spread over a bank without restraint. Its brilliant Autumn foliage of orange and scarlet is especially fine. This shrub can be cut to the ground every three or four years, allowing the removal of any clumps of grass or weeds that may have started.

For an acid soil Swamp Dewberry (*Rubus hispidus*) can be used. It has shiny, compound leaves that take on a rich red coloring in Autumn.

GROUND COVERS

It may be necessary to use a ground cover of vines or plants beneath shrubs to prevent soil wash, which uncovers the roots of shrubs and may cause their eventual death. One of the best of the trailing vines is the Bigleaf Wintercreeper or Evergreen Bittersweet (*Euonymus radicans vegetus*), which is hardy as far north as the southern portion of the Lake Michigan region. For the light soil terrace slope or the

rock wall, the Trumpet Honeysuckle (*Lonicera sempervirens*) is an excellent vine cover to use, and one which is hardy in northern climates. The Virginia Creeper or Woodbine (*Ampelopsis quinquefolia*) can also be used, and in Fall when its leaves become a brilliant crimson, it makes a fine combination with Japanese Barberry (*Berberis thunbergii*). Or it may be planted with Chinese Matrimony-vine (*Lycium chinense*) which bears attractive scarlet fruit in the Fall and is very hardy.

An excellent perennial ground cover is Periwinkle (*Vinca minor*), especially in deep shade; these plants should be set close, about 3 or 4 in. apart. Japanese Spurge (*Pachysandra terminalis*) is another which will grow in shade. A ground cover plant beneath other shrubs on a bank takes care of another difficulty of slope planting; that is, to keep grass out and prevent the slopes from becoming weedy. Kentucky Bluegrass becomes a nuisance at times among shrubs by growing up in tall bunches and going to seed, which makes the slope unsightly. As it is difficult and often inadvisable to cultivate on a slope, the use of ground cover plants helps by choking out the grass. Ground cover plants can also be used with a walled terrace to soften the hard lines of the stone work and make it more interesting.



The terrace slope is an appropriate place for a rock garden

A GARDEN IN THE WALL

It is possible to provide growing places in a masonry wall, around which it would otherwise be hard to get things to grow, by placing 4 in. agricultural drainage tiles through the wall when it is being laid. These tiles are slanted in higher at the face than at the back of the wall, and filled with soil. When the wall is finished these tile pockets can be planted with small rock plants or flowers. Vines can also be placed in them, but for best results a vine should be planted when the wall is being built so that the roots can be placed back into the ground and the vine stem carried through the wall.

Where a dry rock wall is used a rock garden effect can be had by leaving pockets in the wall and planting rock plants and creeping vines in these pockets, allowing them to clamber over the walls.

A very charming treatment, and one which never loses its interest all the year, is where native stone, rock plants and prostrate evergreens are used together. The native evergreens are best for this. The low growing Prostrate Juniper (variety of *Juniperus communis*) is one of the most suitable. Sargent Juniper (*Juniperus chinensis sargentii*), a finer foliated variety, is good for terrace work, and so is Creeping Juniper (*Juniperus horizontalis*), a more compact form than either of the others. On a northern slope where the soil can be kept in an acid condition Canada Yew (*Taxus canadensis*) will thrive in all its beauty.

ROCK GARDEN AS A TERRACE FEATURE

The treatment of a terrace slope as a rock garden is quite in keeping with Nature if correctly done; in fact, it is the appropriate place for a rock garden on the home grounds. Here can be used all those delightful small rock plants that need vacant spaces to set off their charm. Used in a rock wall garden they make a pleasing transition between rocks and evergreens. The *Sedums* or Stonecrops with their mosslike foliage and blooms of various colors are excellent to use, as also are *Sempervivums* which form the fleshy rosettes of foliage commonly known as Hen-and-chickens, and the low growing *Veronicas* or Speedwells. *Alyssum saxatile* or Goldentuft, *Phlox subulata* or Moss Pink, *Dianthus deltoides* or Maiden Pink, and *Heuchera sanguinea* or Coralbells, are also among the more common rock plants that make a good showing. Another plant to use with evergreen shrubs is *Yucca* (*Yucca filamentosa*) which with its evergreen blades keeps spirit in the picture all the season. It has immense spikes of creamy white blossoms

in June and July. The Yucca will endure very dry conditions, and because of its somewhat spectacular habits can be used as a single specimen plant.

PURPOSE OF PLANTING THE HILLSIDE OR TERRACE SLOPE

The planting of the hillside or terrace should make the whole effect more pleasing to the eye. Where it is necessary to have two or more levels, the planting should be arranged so that the eye is carried easily from one level to the next and the slopes seem to be continuous.



Showing rock treatment at end of terrace. Dwarf shrubs and vines will help relate garden to building

In general, the initial cost of building a walled terrace will be more than planting a slope to shrubs; and, likewise, it will be more expensive to plant the slope in shrubs and vines and ground cover plants than to seed it with grass. But used to fill their proper need, each treatment will be most practical in the end since the upkeep will be less. And the beauty and satisfaction which will result from the added expense will be well worth while.

For suggestions in building and planting your terrace or hillside, you can do no better than to get out where there is natural country and vegetation, where trees and shrubs and flowers are growing wild in their natural state. The growth on natural slopes and the form of slopes themselves near your home are the best indications of "how to do it."

PLANTING LIST

SHRUBS

For Light Sandy Soils

Jersey-tea.....	<i>Ceanothus americanus</i>
Gray Dogwood.....	<i>Cornus paniculata</i>
Japanese Barberry.....	<i>Berberis thunbergi</i>
Fragrant Sumac.....	<i>Rhus canadensis</i>
Smooth Sumac.....	<i>R. glabra</i>
Mountain Currant.....	<i>Ribes alpinum</i>
Meadow Rose.....	<i>Rosa blanda</i>
Downy Viburnum.....	<i>Viburnum pubescens</i>

For Heavy Clay Soils

Japanese Barberry.....	<i>Berberis thunbergi</i>
Swamp Dewberry.....	<i>Rubus hispidus</i>
Common Snowberry.....	<i>Symphoricarpos racemosus</i>
Coralberry.....	<i>S. vulgaris</i>

For Slopes with Northern Exposure

Japanese Barberry.....	<i>Berberis thunbergi</i>
Mountain Currant.....	<i>Ribes alpinum</i>
Swamp Dewberry.....	<i>Rubus hispidus</i>
Common Snowberry.....	<i>Symphoricarpos racemosus</i>
Coralberry.....	<i>S. vulgaris</i>

For Slopes with Southern Exposure

Gray Dogwood.....	<i>Cornus paniculata</i>
Rock Cotoneaster.....	<i>Cotoneaster horizontalis</i>
Fragrant Sumac.....	<i>Rhus canadensis</i>
Mountain or Alpine Currant.....	<i>Ribes alpinum</i>
†Prairie Rose.....	<i>Rosa setigera</i>
†Dorothy Perkins Rose.....	<i>Rosa wichuraiana</i> (hybrid)

SHRUBS FOR THE AVERAGE SOIL SLOPE

†Weeping Forsythia (Goldenbells).....	<i>Forsythia suspensa</i>
Regel Privet.....	<i>Ligustrum ibota regelianum</i>
Acanthopanax (Fiveleaved Aralia).....	<i>Acanthopanax pentaphyllum</i>

DWARF EVERGREENS

Prostrate Juniper.....	<i>Juniperus communis depressa</i>
Creeping Juniper.....	<i>J. horizontalis</i>
Sargent Juniper.....	<i>J. chinensis sargentii</i>
Canada Yew.....	<i>Taxus canadensis</i>

TREES FOR BINDERS

†Redbud.....	<i>Cercis</i>
†Flowering Dogwood.....	<i>Cornus florida</i>
Hawthorn.....	<i>Crataegus</i> varieties
Common Locust.....	<i>Robinia pseudoacacia</i>
Great Silverbell.....	<i>Halesia tetraptera</i>
Crab Apple.....	<i>Malus</i> varieties
†Sassafras.....	<i>Sassafras</i>

VINES FOR SLOPES AND WALL TREATMENTS

Virginia Creeper or Woodbine.....	<i>Ampelopsis quinquefolia</i>
American Bittersweet.....	<i>Celastrus scandens</i>
†Bigleaf Wintercreeper or Evergreen Bittersweet.....	<i>Euonymus radicans vegetus</i>
Trumpet Honeysuckle.....	<i>Lonicera sempervirens</i>
Chinese Matrimony-vine.....	<i>Lycium chinense</i>
Memorial Roses.....	<i>Rosa wichuraiana</i> varieties
Virgins-bower.....	<i>Clematis virginiana</i>

GOOD GROUND COVERS FOR SHADE

Virginia Creeper or Woodbine.....	<i>Ampelopsis quinquefolia</i>
American Bittersweet.....	<i>Celastrus scandens</i>
†Bigleaf Wintercreeper or Evergreen Bittersweet.....	<i>Euonymus radicans vegetus</i>
†English Ivy.....	<i>Hedera helix</i>
†Hall Japanese Honeysuckle.....	<i>Lonicera japonica halliana</i>
*†Pachysandra or Japanese Spurge.....	<i>Pachysandra terminalis</i>
Swamp Dewberry.....	<i>Rubus hispidus</i>
*Common Periwinkle.....	<i>Vinca minor</i>
Virgins-bower.....	<i>Clematis virginiana</i>

PERENNIAL PLANTS AND FLOWERS FOR THE ROCK GARDEN OR WALL

Goldentuft.....	<i>Alyssum saxatile</i>
Alpine Columbine.....	<i>Aquilegia alpina</i>
American Columbine.....	<i>A. canadensis</i>
Alpine Rockcress.....	<i>Arabis alpina</i>
Corsican Sandwort.....	<i>Arenaria balearica</i>
Rock Aster.....	<i>Aster alpinus</i> varieties
Carpathian Bellflower.....	<i>Campanula carpatia</i>
Harebell.....	<i>C. rotundifolia</i>
Snow-in-summer.....	<i>Cerastium tomentosum</i>
Wallflower (Siberian).....	<i>Cheiranthus allioni</i>
Maiden Pink.....	<i>Dianthus deltoides</i>
Perennial Candytuft.....	<i>Iberis</i>
Crested Iris.....	<i>Iris cristata</i>
Dwarf Iris.....	<i>I. pumila</i>

PERENNIAL FLOWERS FOR THE ROCK GARDEN OR WALL—Continued

European Catmint.....	<i>Nepeta mussini</i>
Amoena Phlox.....	<i>Phlox amoena</i>
Blue Phlox (wild).....	<i>P. divaricata</i>
Moss Phlox.....	<i>P. subulata</i>
White Stonecrop.....	<i>Sedum album</i>
Orange Stonecrop.....	<i>S. kamtschaticum</i>
Goldmoss.....	<i>S. acre</i>
Spiderweb Houseleek.....	<i>Sempervivum arachnoideum</i>
Sand Houseleek.....	<i>S. arenarium</i>
Roof Houseleek.....	<i>S. tectorum</i>
Woolly Thyme.....	<i>Thymus serpyllum lanuginosus</i>
Mother-of-thyme.....	<i>T. serpyllum</i>
Creeping Speedwell.....	<i>Veronica repens</i>
Rock Speedwell.....	<i>V. teucrium rupestris</i>
Viola (Tufted Pansy).....	<i>Viola cornuta</i> Jersey Gem
Common Yucca (Adams Needle).....	<i>Yucca filamentosa</i>

ANNUAL PLANTS AND FLOWERS FOR THE ROCK GARDEN OR WALL

Pink Sandverbena.....	<i>Abronia umbellata</i>
Sweet Alyssum.....	<i>Alyssum maritimum</i>
Chinese Forget-me-not.....	<i>Cynoglossum amabile</i>
California-poppy.....	<i>Eschscholtzia</i>
Painted Gaillardia or Blanketflower.....	<i>Gaillardia pulchella picta</i> (for very hot dry situation)
Drummond Phlox.....	<i>Phlox drummondii</i>
Harebell Phacelia.....	<i>Phacelia campanularia</i>
Common Portulaca or Rose Moss.....	<i>Portulaca grandiflora</i>
Common Sanvitalia or Mexican-zinnia.....	<i>Sanvitalia procumbens</i>

†These Plants are not hardy in colder climates.

*Dwarf plants 6 to 8 in. high.



Chapter V

FOUNDATION PLANTING

By LEONARD H. JOHNSON

Materials to Be Used—Arrangement of Material—Selection and Arrangement of Plants—Points to Remember in Planting

SINCE foundation planting is a subject that can and should be of real interest to those who make up the great American public of house owning citizens, we shall endeavor to outline a few of the fundamental principles governing the use of materials and their arrangement, so that there may be a better understanding of what constitutes a good planting for a given condition.

Suppose you had recently purchased or built a new home, the grounds being practically barren of plant growth, especially near the house, and that it seemed to stand alone with little or no relation to its surroundings—that it might be picked up and moved without leaving a scar on the landscape. To unite this house with the grounds, so as to appear in a few years as though they had grown together into a permanent unity, is the problem we wish to discuss.

When it comes to the specific task of blending together the house with the grounds, it may be well to consider the following factors which will govern the type of planting necessary:

Type of architecture.

Shaded or exposed locations.

Soil.

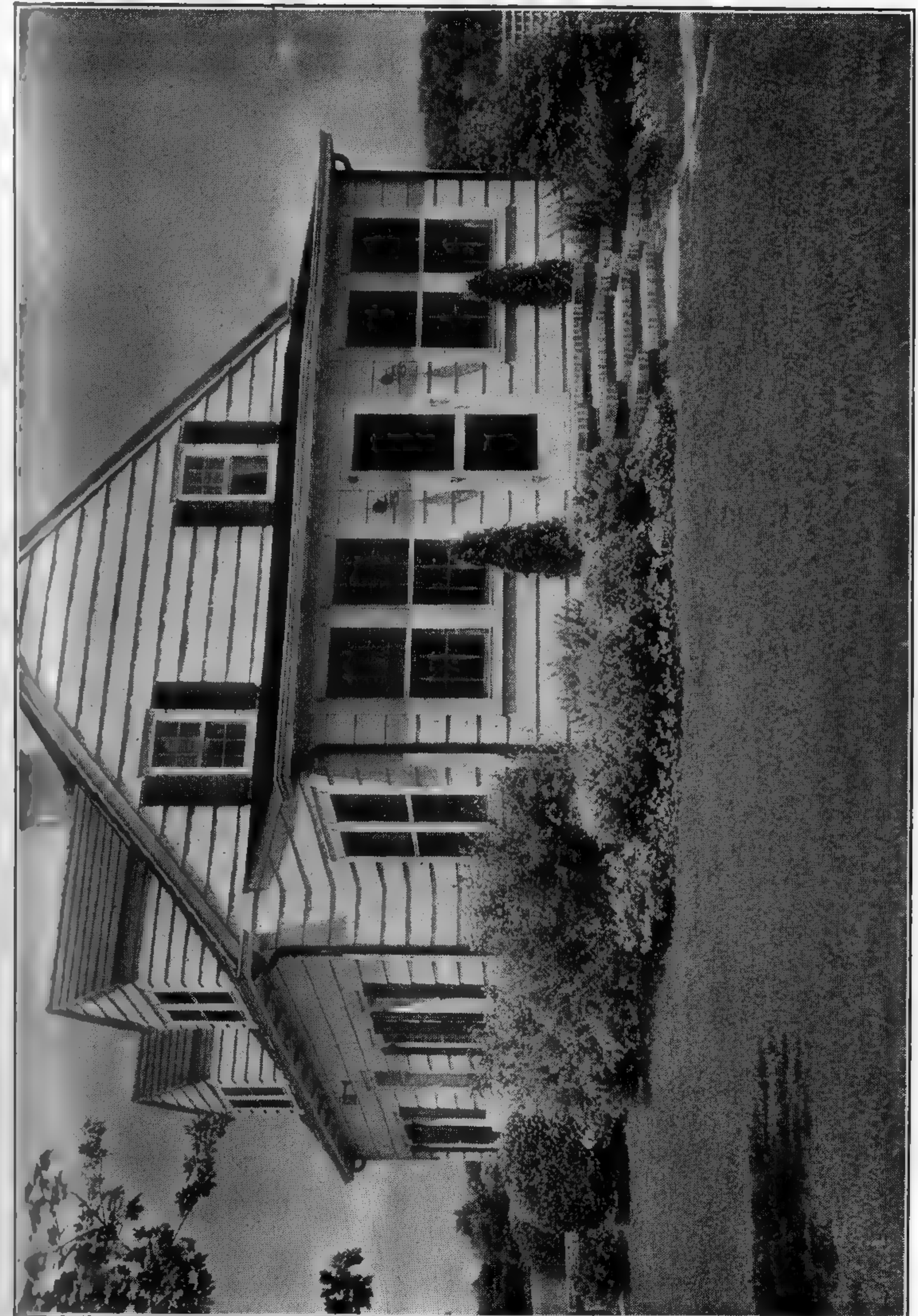
Is an all-year effect desired?

The kind of a foundation.

The geographical locations.

MATERIALS TO BE USED

The most desirable classes of material for foundation planting are the dwarf growing evergreens and the refined types of flowering shrubs. Under the evergreen class we have what are termed the broad-leaf evergreens, such as Rhododendrons, Azaleas, Andromedas, Mountain-laurel, etc. This material, when used in masses, gives a very pleasing effect and is readily adapted to shaded situations.



It is not always necessary to spend a lot of money in order to gain an attractive planting. The owner of this place paid a very modest sum for the material used here. The effect of old Boxwood at the main entrance was gained by the use of Privets trimmed into globe shape. At various points evergreens were used to add a touch of life and color during the Winter.

Some of the most desirable flowering shrubs and those commonly used are Spireas, Weigelas, Dwarf Deutzias, Japanese Barberry (if kept away from walks or much used porches), Hydrangeas (the Peegee variety being too coarse and large for most plantings), Japanese Kerria, Privet (Amur, Lodense and Regel), Winter Honeysuckle, Lilac Honeysuckle, Mockoranges (such as Avalanche, Bouquet Blanc, Golden, Lemoine and Virginal), Snowberry, Coralberry and White Kerria.

Among the evergreens effectively used are Mugho Pine, Japanese Yew (both spreading and upright), Arborvitaes (from the dwarf globe to the tall pyramidal forms), Junipers (including the prostrate to the narrow upright forms), and the various forms of dwarf Cypress and Retinospora.

As stated before, some of the most pleasing effects may be had through a proper combination of the broadleaf evergreens, where the soil and climate will permit their use. Those commonly used are Azaleas, Mountain-laurel, Oregon Hollygrape, Rhododendrons, Andromeda, Inkberry, Leucothoe and Japanese Holly. The majority of these plants bear attractive blooms in the Spring and produce a massed effect that is difficult to obtain by the use of the other class of evergreens.

No matter how well a planting may be made in the beginning, if it does not have proper care over a period of years, it is likely to prove a disappointment. Plants should be cut back or transplanted when they begin to crowd and replaced now and then when they die out.

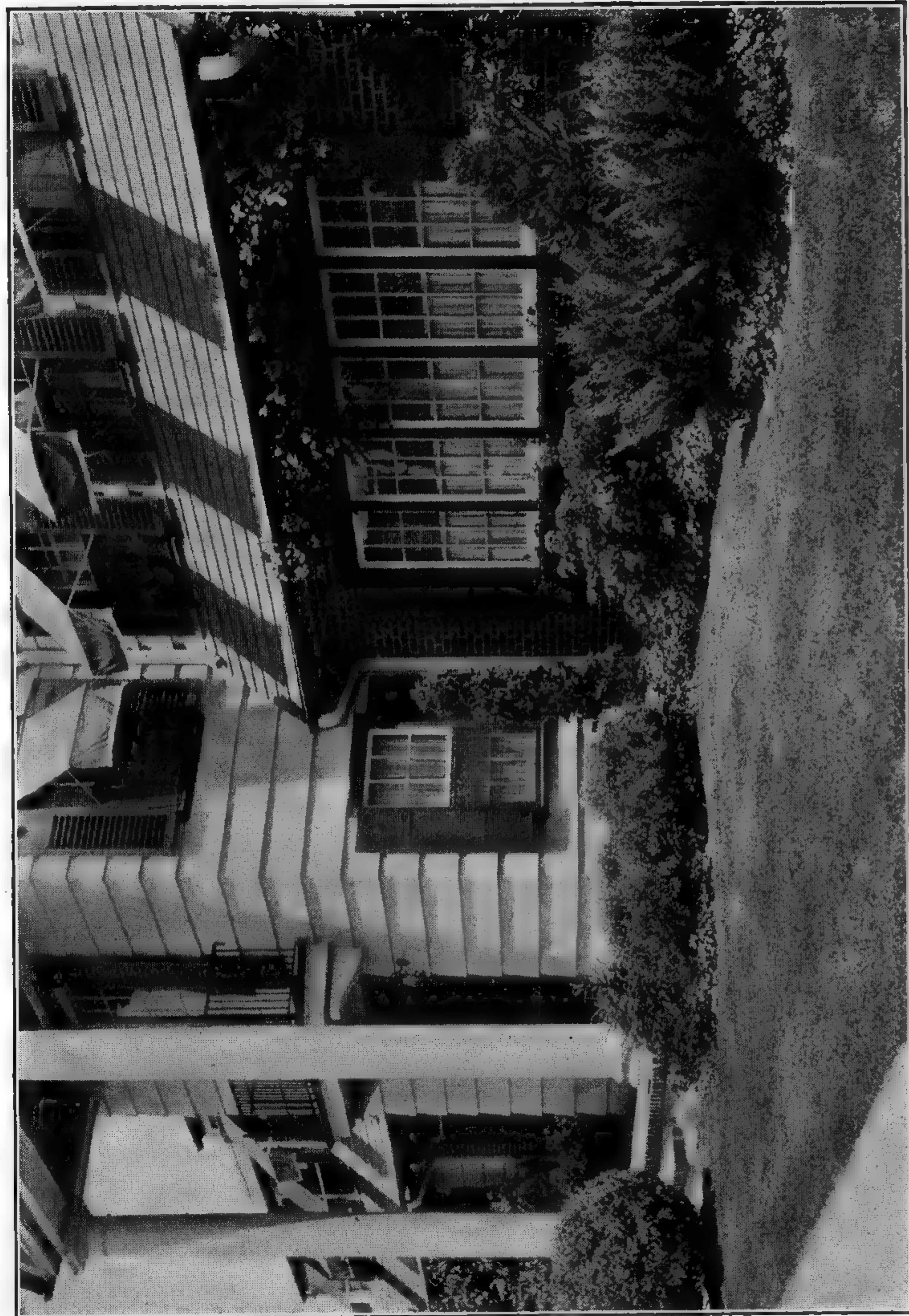
In the East especially, foundation planting material for the past decade has been largely made up of coniferous evergreens. In the writer's judgment this has been overdone, and there seem to be but two logical reasons for it: first, the various forms and colors of the individual species attract the attention of the inexperienced suburbanite who goes to the nursery to select his plants; second, in an endeavor to have an all-year-round effect, the flower and foliage of deciduous material is sacrificed. An effective foundation planting is not gained through the relative merits of individual plants, but through an effective grouping of masses, together with certain outstanding accents.

It seldom seems customary to consider vines as a part of the foundation, yet much may be gained to complete the picture if they are used in the proper way to soften architecture and assist in uniting the house and plantings with the surrounding grounds.



Before and After Planting

A planting does not necessarily have to be limited to the front of the house. When carried to the rear or sides, it often creates an attractive setting, such as is illustrated above, besides hiding certain objectionable objects (service entrance and cellar door in this case)



Irregularly spaced plants, especially evergreens, may be effectively tied together by a ground cover of Japanese Spurge (*Pachysandra terminalis*). This is proving to be almost an indispensable item in creating a good job of planting

Herbaceous perennials may be added from time to time to the borders of the foundation planting, but with a certain amount of restraint and much care in the selection of varieties. In this connection it may be pointed out that one of the most successful border plants for foundation plantings is Japanese Spurge; it forms a low carpet of greenery that ties together the various planting units.

Because of climatic and soil conditions in the Central Western States, care should be taken to use only those varieties that are known to be hardy there. The intending planter can decide in a large measure what materials to use in these States by looking around his neighborhood and noting the plants that have withstood several seasons. One of the best guides is a catalog of a reputable local nurseryman.

Some of the materials commonly used in the East are Junipers, most types of the American Arborvitae, Mugho and Swiss Mountain Pines, Japanese Yews and most all varieties of hardy flowering shrubs.

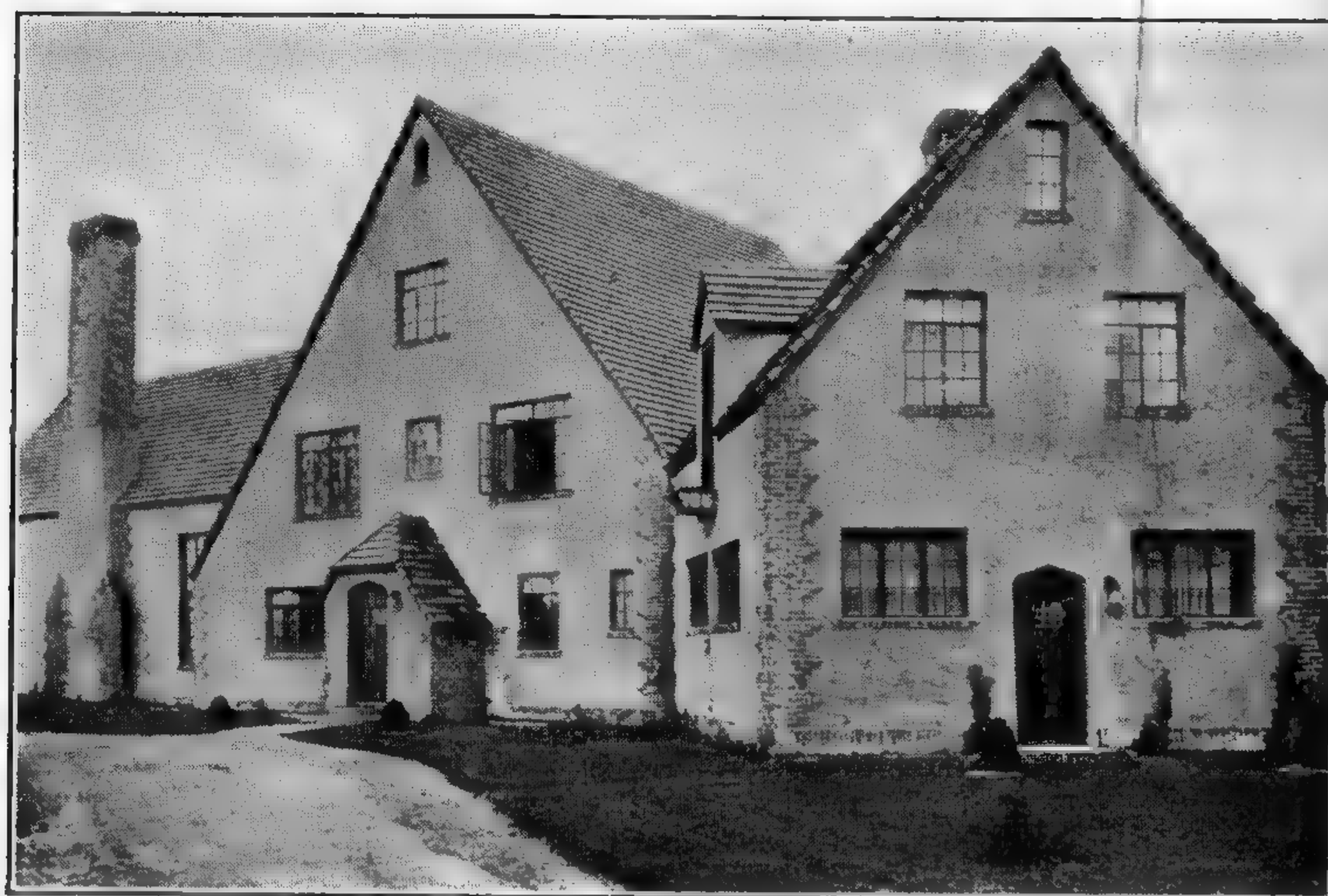
ARRANGEMENT OF MATERIAL

Two of the most common errors made by the amateur enthusiast are overplanting and the use of too much miscellaneous material. Stick to a few varieties and place them where a logical reason is evident.

Let us now consider a few principles of arrangement. For the average type of house it is desirable to choose a few accent points about the front and perhaps sides of the house, and to build the foundation planting upon these. Such accents would usually come at corners, bay windows, porch pillars, and at entrances. The largest and most conspicuous plant should produce the emphasis at these points, and the spaces between and adjacent to them may be filled with neutral material of smaller size and softer texture.

There seems to be a prevailing idea that a foundation planting must extend entirely around the house in a continuous manner. This may be desirable only when the foundation of the house is altogether too high or very ugly, but it is much better practice to leave certain sections of the house open to view. Especially is this true of many of the modern houses where there is no visible foundation.

In certain types of rather severe, straight-front houses, wall panels are formed by windows that often produce prominent points for accent plants. Care should be exercised, however, in not having too many accents, for too many produce no better effect than none at all.



Before and After Planting

An informal house of English architecture ready to be enhanced or spoiled by a foundation planting. By following a few fundamental rules, as outlined in the text, a satisfactory job of planting is accomplished

Bad features of a house may often be overcome or helped by judicious planting. A tall, square house may be planted effectively by extending the planting at the corners sufficiently to make a more gradual transition between lawn and house.

If a planting about the house is made in groups, each unit should be made complete and in harmony with the others. The following plants (evergreens) usually make effective groups: One or more tall plants, such as Pyramidal Arborvitaes, Junipers or Taxus for accent, and a few low spreading types at the base, such as Pfitzer Juniper, Douglas Golden Juniper, Spreading Yew, Mugho Pine or Savin Juniper. It is better to use several of one variety than one each of several varieties. The same principle of arrangement holds for flowering shrubs or broad-leaf evergreens.

If a planting is to be carried out over a period of several years, it is advisable to have a preconceived plan in mind or on paper, and then add whatever can be afforded each year.

Practically all varieties of evergreens and flowering shrubs may be planted successfully in the Fall as well as during the Spring months. In fact, many authorities on this subject prefer Fall planting to Spring, advancing the theory that the ground is warm and inducive to much root growth, thus establishing the plant before the Winter sets in. Thorough watering periodically is essential until the plant is well established.

To have a clearer understanding of the above, suppose we select a sample house or two and proceed to plant. In the first place, let it be understood that there are no set rules to go by that may be applied to this or any other house. Each is a distinct and individual problem, but there are any number of ways in which to plant that would prove effective.

House, as illustrated at top of page 60, has just been completed and is ready to plant. Let us first consider its general surroundings: (a) It is a house in the suburbs with quite a natural setting. (b) The exposure is not so severe but what one can use the more common types of plant material with little risk. (c) The owner does not want a show place but a naturalistic, restful planting that will be in keeping with the natural surroundings. (d) The house, being of cream stucco without a visible foundation, will not call for heavy massed plantings, which is often necessary when a high, ugly foundation is to be concealed. (e) It is not balanced symmetrically, so we need not balance the planting except for the ocular balance (the

masses being balanced to the eye). (f) The house faces practically north, which means that the planting will receive considerable shade most of the day; this is important. (g) The house is quite large, so we should use at least fair sized material to start with, unless economy forbids it. On this point many people make the mistake of trying to spread a limited amount of money as far as possible by selecting cheap, fast growing plants that must be replaced in a few years. Such plantings cost more in the end. If you haven't the money to plant for an immediate effect, you have the time to wait until the plants grow.

SELECTION AND ARRANGEMENT OF PLANTS

In following through the above seven points that actually exist, we note in "a" that surroundings are natural. This calls for plants that are irregular, soft, conservative of color, and since "f" indicates shade we must select plants adapted to it. The following is a list of evergreen material found in most any fair sized nursery that will fit such requirements:

- *Japanese Holly.....*Ilex crenata*
- Mountain-laurel.. ..*Kalmia latifolia*
- *Rhododendron.....*Rhododendron maximum*
- *English Ivy.....*Hedera helix*
- *Japanese Spurge.....*Pachysandra*
- *Japanese Andromeda.....*Pieris japonica*
- *Boxwood.....*Buxus suffruticosa*
- Oregon Hollygrape.....*Mahonia aquifolia*
- Azaleas in variety.....*Azaleas*
- *Japanese Yews.....*Taxus cuspidata*
- Inkberry.....*Ilex glabra*

Seven varieties of evergreens (checked with an asterisk—*) constituted the entire planting, and this is much better than trying to use a little of everything possible.

The English Ivy was used to produce height in greenery on the house, as well as to partially hide the considerable amount of stucco surface.

At the main corners and angles of the house, fair sized specimens of Rhododendrons and upright Japanese Yews were used. These were gradually united with the lawn by an intermediate planting of spreading Yews and Japanese Andromeda. Between these main groups, a planting of Japanese Holly, spreading Yews and Japanese Spurge



Above, a good illustration of a typical suburban home where the owner has tried to economize by purchasing any old evergreens, so long as they were cheap. It reminds one of so many "ten pins," set up ready for some one to make a "strike." Below, the same house made cozy and attractive with very little additional cost. In this case, the plants were especially selected to fit the purpose for which they were used

was used rather irregularly, the entire planting being tied together with a ground cover of Japanese Spurge.

Now let us consider a typical city house on a small lot with the damaging elements that the city usually affords, such as smoke, gases, etc. (See illustrations on page 65.) We do not have the natural surroundings that are found about the house previously considered. It is occupied the year around, so, naturally, the owner prefers evergreens, with probably a few refined shrubs for Summer color.

This planting is rather inexpensive and considerably more "set" than that on page 60. The house faces the south, permitting the more regular types of evergreens to be used to frame the flag terrace, and purposely kept low for good circulation of air. The east and west corners of the house were built up with heavier plant groups.

Plant material suitable for city planting is as follows:

EVERGREENS

Pfitzer Juniper.....	<i>Juniperus pfitzeriana</i>
Mugho Pine.....	<i>Pinus mughus</i>
Japanese Yew.....	<i>Taxus cuspidata</i>
Evergreen Bittersweet.....	<i>Euonymus japonica</i>
Rock Cotoneaster.....	<i>Cotoneaster horizontalis</i>
Japanese Holly.....	<i>Ilex crenata</i>

SHRUBS

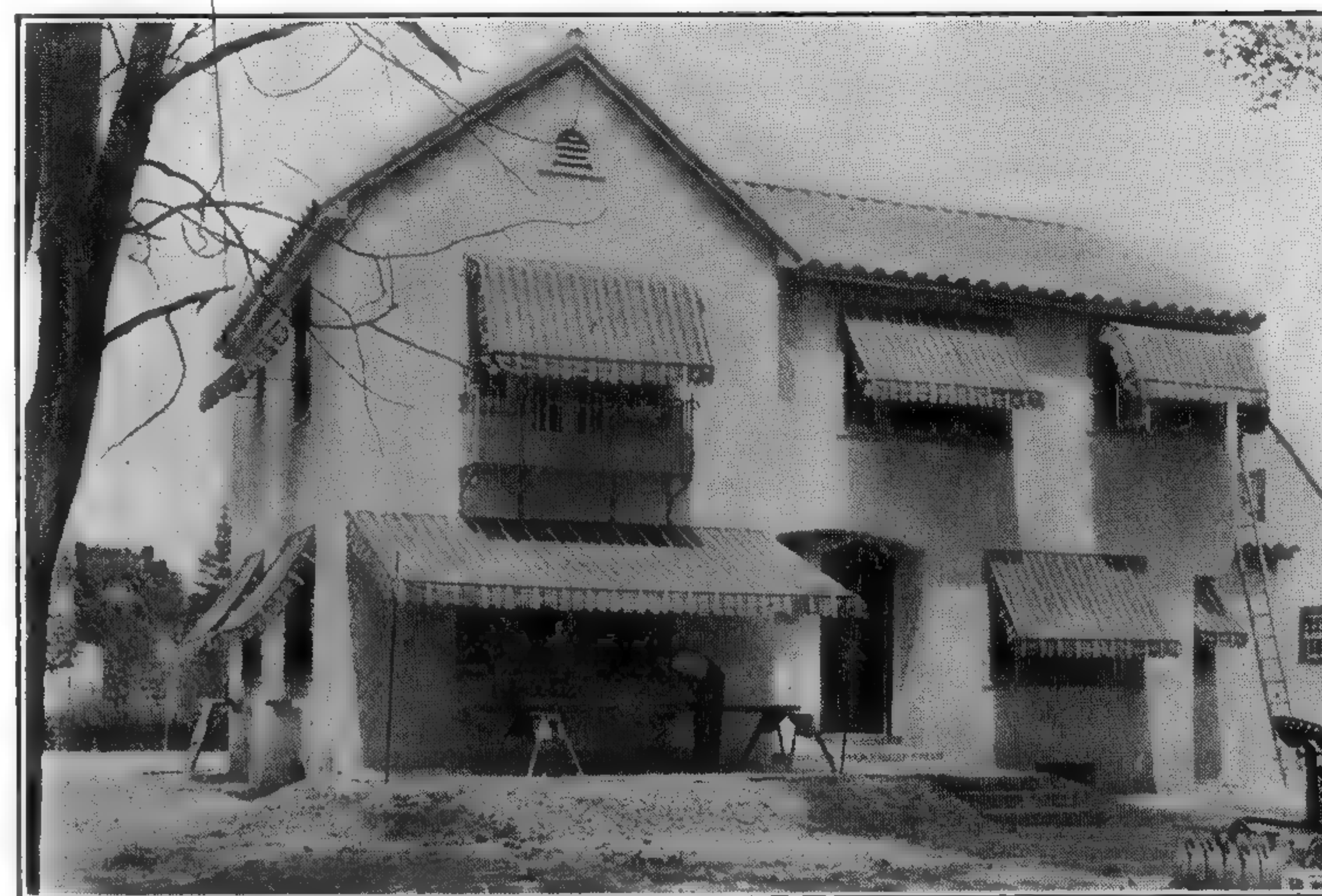
Japanese Barberry.....	<i>Berberis thunbergi</i>
Fuzzy Deutzia.....	<i>Deutzia scabra</i>
Goldenbells.....	<i>Forsythia</i>
Jetbead.....	<i>Rhodotypos kerrioides</i>
Weigela.....	<i>Weigela</i>
Vanhoutte Spirea.....	<i>Spiraea vanhouttei</i>
European Cranberrybush.....	<i>Viburnum opulus</i>
Privet.....	<i>Ligustrum</i>

POINTS TO REMEMBER IN PLANTING

Let us sum up the important things to remember in planting the foundation:

PURPOSE

- Connect house with grounds and surroundings.
- Soften harsh architectural lines of the house.
- Help screen objectionable objects.
- Help dress up the whole place.



Before and After Planting

For the foundation planting of a house like this it is well to consult a nurseryman who has good ideas to offer. A nurseryman who has only plants to sell could easily ruin its appearance by smothering it with fast growing plants

PROPER USE OF MATERIAL

- (a) Keep material in scale with building.
- (b) Use refined plants and avoid fast growing, coarse material for the average home.
- (c) For shaded places plant Privets, Barberry, Viburnums and practically any of the broadleaf evergreens, providing the soil contains no lime.
- (d) Dwarf evergreens, such as dwarf forms of Arborvitae, Yews, and some of the Retinosporas, are preferred for small homes.
- (e) Use larger plants at strategic points for accent.
- (f) For balanced formal buildings use regular and symmetrical plants in balanced groupings.
- (g) Plant higher material in background and lead gradually to the lawn, if space will permit.
- (h) Use Japanese Spurge (preferred in shade) as a ground cover between evergreens.
- (i) Plant a high appearing house at each end, using good sized groups and gradually meet the lawn.
- (j) Plant a low, squatty house with accent toward the center.

SOME DON'TS

- (a) Don't overplant and crowd.
- (b) Don't use large growing plants, such as Pines and Spruces.
- (c) Don't use too many specimens for accent.
- (d) Don't use too many different kinds in a small planting.
- (e) Don't forget to fertilize well when planting is made (rotted manure is best with humus added for broadleaf evergreens), and keep planting moist for first year at least; a mulch of peat moss will do this.
- (f) If fast-growing Retinosporas, Cedars and Arborvitae are used, don't forget they need occasional shearing.
- (g) Don't use thorny plants such as Japanese Barberry near walks or steps.
- (h) Don't buy a collection of plants just because they are cheap when they may not be suited to your locality, exposure or type of house. It is false economy, as many have come to learn.
- (i) Don't plant Rhododendrons, Laurel, Azaleas and Andromedas in a soil containing lime. It should test acid.

*For a complete work on the subject of this
chapter we recommend*

FOUNDATION PLANTING, by LEONARD H. JOHNSON.

Secure this book where you bought your Garden Guide.



Chapter VI

ROSES IN THE GARDEN

By G. A. STEVENS

**Bedding Roses—Shrub Roses—Climbing Roses—Types of Roses
to Plant—Soil and Site—Kinds of Rose Plants—Time of
Planting—Planting Hints—Summer Care—Insect Pests—
Diseases—Cutting Flowers—Winter Protection—Pruning—
Propagation—Summary**

IF we are going to have Roses in the garden we ought to know what Rose plants are like and what may be expected of them.

To many city bred people Roses are beautiful flowers which are bought in the flower stores and market stands. Perhaps not one person in a hundred knows how they are grown and how the highly specialized plants which produce them differ from the Rose bushes of hearsay, song and story.

To country people the modern Roses are also a little strange, especially to the older generation which grew up with the great briery bushes in village yards or on the farm.

If I tried only slightly I could fill this chapter with descriptions of different kinds of Roses, for there are divisions, subdivisions, types and varieties, meticulously classified almost to the point of absurdity. All these have been created by plant breeders and enthusiasts to satisfy some purpose or ideal, but it all amounts to this:

There are three kinds of Roses.

1. *Bedding Roses.* Plants which are grown primarily for their beauty of bloom, either cut or in the garden. The plant itself is of secondary importance.
2. *Shrub Roses.* Either species or hybrids which make large bushes and are grown not only for their flower display, but also for the beauty of the plants.
3. *Climbing Roses.* A large group, more vigorous than the shrubs, used either for covering arches or trellises in the way that other climbing plants are used, or as ground covers and trailers, as the case may be.

BEDDING ROSES

Under this heading can be grouped a vast medley of types whose primary purpose is to furnish a brilliant display in the garden, or long stemmed beautiful flowers for cutting.

Hybrid Teas

Most important of these types are the Hybrid Teas. Not only are they useful for garden display, but the exquisitely formed flowers, both in bud and open bloom, are the finest of all Roses for cut flower



Bedding Roses

use. It is from this class that the long stemmed beauties bought at flower shops are obtained.

A normal Hybrid Tea Rose grows from 18 in. to 3 ft. high and the plant will cover about 2 sq. ft. of ground. They can be grown with the greatest ease in any part of the country where the thermometer does not fall below zero in Winter. In colder climates they must be protected during the Winter, but their dwarf growth and their ability to renew themselves from the ground level in one season, makes them easy to care for even in climates which are very severe.

Hybrid Teas produce handsome flowers abundantly throughout the entire blooming season. The entire color range of the Rose family is represented, including shades of orange, coppery pink and yellow, which are rare in other classes. The plants which produce these warmly colored flowers are sometimes classed as Pernetianas, but in the average garden they may be considered as Hybrid Teas and treated just the same.

Tea Roses

Older than the Hybrid Teas is the race of Tea Roses which are not recommended for planting in the Northern States because of their tenderness to cold; but have unusual value in the South where their almost evergreen foliage and their continuous bloom offer even greater advantages to the grower than the Hybrid Teas. The flowers of the Tea Rose are exquisitely formed and generally sweetly scented, but they lack strong color. Most of them are pink, pale yellow or white. The Tea Roses were one of the parents of the Hybrid Tea race.

Hybrid Perpetuals

The other parent of the Hybrid Tea was the Hybrid Perpetual group. These are generally vigorous plants averaging 3 to 6 ft. in height, blooming most profusely in early Summer and throwing scattered flowers in the Autumn. Their flowers are large, well formed, generally fragrant, and are stiffer, bolder and more robust in appearance than either Teas or Hybrid Teas. The range of color is limited to white, pink, crimson and intervening shades. The few attempts at yellow and salmon are more or less inadequate.

Hybrid Perpetuals are useful in climates where Hybrid Teas are grown with difficulty because of the Winter cold, but they are not

nearly so hardy as some writers would have us believe. Hybrid Perpetuals must be protected in sub-zero weather, otherwise they will freeze to the ground as readily as any Hybrid Tea. For that reason Hybrid Teas are generally preferred in Northern gardens, and in the South there is little or no excuse for planting Hybrid Perpetuals because they bloom freely only once a year.

Polyanthas

There is one more important type of bedding Roses. This is the Polyantha race. The plants are generally sturdy little bushes ranging from 1 to 3 ft. in height, and usually cover themselves throughout the season with clusters of relatively small flowers. The scentless blooms have a papery texture but their bright color and long lasting qualities give them high value for garden decoration.

There is a great deal of variation among the different varieties of Polyanthas, especially in the habit of the plants; they all agree in being of more or less indifferent value as cut flowers, but no plant of any species exceeds them in decorative quality over so long a season.

Other Types

Other types of bedding Roses may be met with now and then, such as the Chinas or Bengals, and the Bourbons, but they are unimportant and are seldom considered separate from the Polyanthas or Teas.

SHRUB ROSES

All gardeners are familiar with Lilacs, Spireas, Deutzias and Philadelphus, recognizing their beauty of flower and the varying charm of habit, but a great many do not know, or have forgotten, that Roses are also shrubs equal or superior to many of these in all the qualities which make a shrub worth having.

Almost all wild Roses are good shrubs, not the wild Roses we usually see in the fields and along roadsides where they are subject to damage by man and beast, but grown with proper care and protected from injury. American wild Roses are few compared with the number of European and Asiatic species, many of which have been cultivated for centuries.

Species

In catalogs wild Roses are usually called "Species Roses" and because they are creations of nature not subject to whims of changing



The flowers of a Shrub Rose
This is the species, *Rosa spinosissima altaica*

fashions, the best of them can be named here with the assurance that always they can be obtained, because their appeal is universal and timeless.

Rosa hugonis is a big shrub 7 to 8 ft. high. It has a fountain-like habit and is covered, in Spring with a multitude of single light yellow flowers. *Rosa ecae* is a similar plant with creamy-white and primrose yellow blooms. *Rosa moyesi* has dark blood red flowers; while *Rosa willmottiae* has tiny lavender pink, enamel-like blooms and ferny foliage. *Rosa spinosissima* is bristly and fierce looking, dwarf in some forms with little cupped flowers of pink, white and yellow, some single, some double.

Occasional named varieties are grown which belong to the *spinosissima* group. Most important is Harison's Yellow, a fine old fashioned Rose which has survived in yards and gardens, neglected and admired, for a hundred years; and the single white flowered *Altaica* brought from Mongolia not so many years ago.

R. rugosa is a great rough brier from Eastern Siberia. It exists in several forms, white-flowered, red or pink, and it has been developed into numerous double flowering varieties, all of which are good shrubs. Besides these there are *Rosa rubrifolia* with starry pink flowers and ruddy foliage, and *Rosa foetida bicolor*, the remarkable Austrian Copper, whose flowers are unbelievably brilliant in shades of orange, copper and yellow.

A dozen other lovely wild Roses and hybrids of shrub habit lurk in the back pages of catalogs and can be discovered by any diligent searcher. All are worthy and all are good if they are considered as shrubs, planted as shrubs, and cared for as shrubs.

CLIMBING ROSES

In the true sense of the word, no Rose is a climber. The best of them merely scramble or trail, requiring the assistance of some support to be kept within proper garden limits. Climbing Roses fall naturally into two broad classes based on their hardiness.

Tender Climbers

The tender climbers are vigorous forms of Teas or Hybrid Teas and a few other large flowering types, and seldom succeed where the thermometer drops more than a few degrees below freezing.



A typical large-flowered Climbing Rose

The tender climbers are inclined to bloom more or less frequently throughout the entire season, and for that reason should be relied upon in mild climates for the main climbing Rose display.

Hardy Climbers

In the North where zero weather, or worse, may be expected it is wise to rely upon the hardier strains developed from *Rosa multiflora* and *Rosa wichuraiana*, hybridized with Hybrid Perpetuals, Hybrid Teas and other garden varieties. The majority of these Hardy Climbers produce relatively small flowers in bunches. They make immense

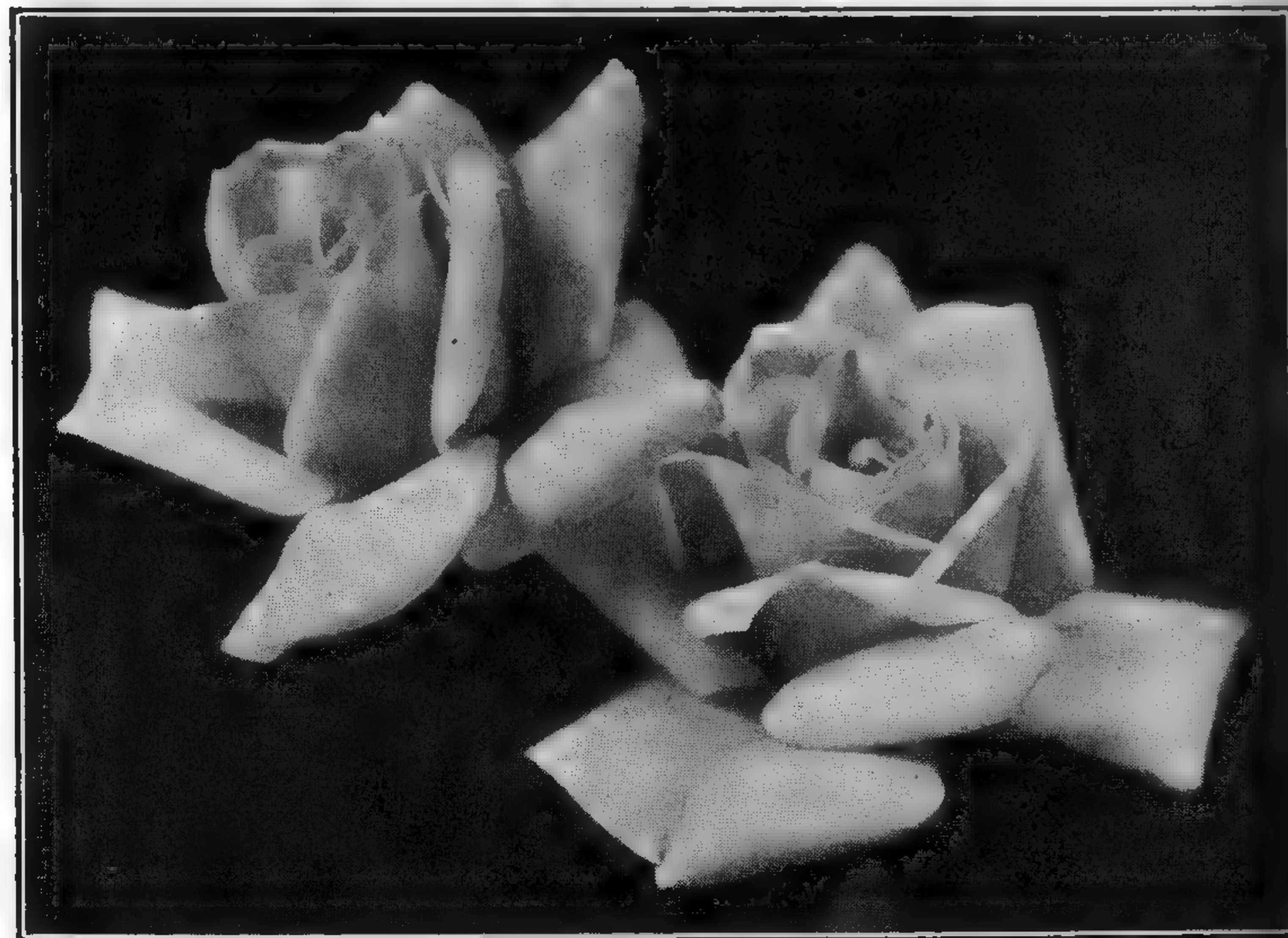
long canes, which are pliable enough to be trained on pillars, arches, pergolas, Summer houses or into any position the gardener wants to place them. They bloom profusely in early Summer and seldom thereafter.

New Class

Recently an intermediate class of Climbing Roses has been created which bear flowers as large and fine as those of the Tender Climbers, but the plants appear to be just as hardy as those of the small flowered class. Proof of this hardiness has not been definitely established, but because of their beauty and greater resistance to cold than the ordinary large flowered climbers, they deserve a trial to determine just how far north they may be useful.

TYPES OF ROSES TO PLANT

Naturally, the kind of Roses you are going to grow depends upon what you expect of them, the kind of soil and amount of room you have, and where you live.



Flowers of Hybrid Tea Roses are exquisitely perfect

Purpose

If you have a big lawn, or room for a few shrubs about the house, shrub Roses should be considered as adding an element of beauty not commonly found in such plantings.

If you are interested in flowers for cutting, Teas and Hybrid Teas, including the Pernetianas, will supply what is wanted. In more northerly regions, Hybrid Perpetuals are especially fine; and to some extent Climbing Roses of all types.

If a massed display of flowers is wanted in the garden for a long period, Teas, Hybrid Teas, and Polyanthas must be relied upon.

For fences and hedges, some of the shrub Roses will do, but best results may be expected from training Climbing Roses along a wire or picket foundation. For arches, screens, trellises, pergolas, Summer houses and such uses, Climbing Roses are obviously the right selection; and low growing or trailing varieties are obtainable for covering rough banks, or draping over walls.

SOIL AND SITE

Soil

The kind of soil is not so important as what is done with it. As a general rule, Roses of all kinds prefer clay, but the shrubby types endure almost any kind of soil. Rugosas, for instance, are quite at home in seaside sand. Climbers are almost equally accommodating; and it is a comparatively easy matter to enrich the ground for Teas and Hybrid Teas to a degree which will make them prosper. Do not worry about poor soil; some of the best Roses are grown in heavy gummy clay, and almost equally fine ones may be grown on light, sandy loam.

Drainage

A more important consideration is drainage. Roses intensely dislike soil which is continuously wet. They will not grow unless there is steady drainage of surplus moisture away from their roots.

Drainage is usually satisfactory on loamy soils and on sloping ground. Those who must grow Roses above a hard-pan or in sticky, impervious clay, can remedy the matter by putting several inches of drainage material such as rough cinders, cobble stones, or brickbats in the bottom of the beds, with an outlet into tile drains.

Preparation

Prepare the soil thoroughly. Two feet deep is not too much. Many Roses will do fairly well with less preparation, but a thorough job in the beginning insures success. If cow manure can be obtained, add it to the bottom layers of the bed in the proportion of one-third manure to two-thirds soil. Use rather less of horse, pig, or poultry manure, and make sure it is well rotted before using, or so deeply worked in and broken up that it will not heat and burn the rootlets of newly planted Roses. It is well to do all the digging and fertilizing several weeks before the Roses are to be planted. This will allow time for fresh manure to rot, and for the loose soil to settle properly.

Commercial fertilizers are useful if the natural product is unobtainable, but be careful to use them exactly as prescribed on the packages by the manufacturers.

Size of Beds

Make Rose beds for Teas, Hybrid Teas, Polyanthas and Hybrid Perpetuals narrow enough to reach across without stepping on the bed. Four feet is about the limit; and for small plants 3 ft. is probably better. For shrubs and Climbing Roses prepare the holes 3 ft. in diameter and 2 ft. deep. This will insure fertility for many years to come.

Site

In selecting a location for a Rose garden or a large Rose planting, avoid exposure to the prevailing winds without providing a shelter of some kind. A wall, a high fence, a line of evergreen trees (if they are not too close) will answer the purpose, but as a rule the eastern or southeastern side of a house or a slope with a similar aspect is the best site.

Of course, if only a few Roses are to be planted give them any space that is available. Roses are really quite accommodating and will get along without complaint in places which lack all apparent advantages.

Reassurance

Do not be afraid of growing Roses. There is no secret about their culture. They like good soil and good treatment, but they sometimes astonish us by getting along very well and giving a good account of themselves under conditions which seem unfavorable, and often thrive with so little care that it almost amounts to neglect.

KINDS OF ROSE PLANTS

Success largely depends upon beginning with the right sort of plants. You may select the proper varieties, and prepare the ground perfectly, but if weak or diseased plants are set out, failure will certainly ensue.

Good Plants

Good Rose plants are supplied by reliable nurseries. If you go to a nursery firm of established reputation for Roses, you will get good plants. Money spent for poor plants is just as good as thrown away, so beware of cheap offers and so-called bargains.

"Cheap Plants"

It takes two years of outdoor growing to produce a good Rose plant, and many two-year-old plants are not up to standard grade. These weaklings are graded out by good nurseries and not retailed. Such discarded plants form the basis of most "cheap" offers.

Other so-called "cheap plants" are dumped from the greenhouse benches by wholesale florists who grow Roses for the cut flower trade. These are worn out by years of forcing in Winter and Summer, and are sold for whatever they will bring. All of them are bad bargains.

Again, there are exceptions; and no harm is done by buying a few of such plants for trial, if you realize that results should not be judged by their performance. A good Rose plant, bought from a reliable nursery, is almost certain to grow and bloom. "Cheap" plants are a gamble.

Budded vs. Own Root

The old controversy between those who advocated budded Roses and those who believed that own root Roses were best is practically ended by the virtual disappearance of own root Roses from the market. The vast majority of Roses to be bought nowadays are budded stock; only a few climbers are extensively grown on their own roots.

Potted Roses

Potted Roses are offered in late Spring, and are successful for one season. If they are lifted in Autumn, and replanted after their roots have been properly straightened out, they may continue to grow and prosper; but generally they are useful only as fillers in late Spring and for temporary uses.

It is always best to plant dormant Roses with bare roots.

TIME OF PLANTING

In the Northern States, early Spring is the correct time to plant.

In the middle section, where Winters of moderate severity occur, they may be planted in Autumn or Spring.

In the South, the best time is early Winter after the first freeze-up, or heavy frost, and from then on until Spring opens.

Autumn Planting

Autumn planting has been advocated in the North, but it is far too much trouble to provide the heavy protection needed to prevent the newly planted Roses from Winter heaving and die-back. It is necessary to cover the entire plant with earth after planting, and to remove it in the Spring, and that is a fairly heavy job for a man or woman who does his own work. Spring planting is less trouble.

In the middle section, careful hilling up of the soil will carry the newly planted Roses through the Winter safely, especially if a little extra brush or manure is spread between the hills.

In the South, hilling up the soil around the plant is sufficient protection.

Spring Planting

When planting in the Spring, make sure it is in early Spring. April 15 is about the latest date that Roses can be planted with assurance that they will succeed. Every day after that, decreases the chances of success. Of course this date applies mainly to those regions where the ground is workable before that time, but it also emphasizes the importance of early planting in those climates where the first of May is early Spring. Do not delay planting Roses in Spring beyond the earliest possible time the ground can be worked.

It is wise to hill up the soil around newly planted Roses to protect them from drying winds and unexpected frosts.

PLANTING HINTS

When planting, keep the roots of Roses protected from sun and wind. Make holes in the soil big enough to allow the roots to be spread out naturally, and work the soil between them so that they may be placed in the ground in the same position, as nearly as possible, as they grew in the nursery.

Set the plant just deep enough in the ground that the "bud" is barely covered with soil when the Rose bed is leveled. The "bud" is

the knot, knob, or offset between the roots and the branches, which shows where the Rose was budded on the root. Everything below the "bud" is root, and must be placed under ground. All above the "bud" is top, and should be kept above the ground.

Tramp the earth firmly about the plant as it is put into the hole. Make it so firm in the ground that you cannot pull it up without exerting real effort. Watering is unnecessary unless the ground is very dry, as it is frequently in Autumn. Water may nevertheless be needed after planting in Spring if the weather is dry and windy,



The conspicuous veining of the petals with yellow or deep orange is a characteristic of the Pernetiana strain of Hybrid Tea Roses

otherwise the tops might wither before the roots were sufficiently established to supply moisture from below.

Cutting Back

Tops of Roses planted in the Autumn should be cut about 12 in. long, and at least half of that length should be protected with mounded earth. In the Spring both newly planted Roses and those set out the Fall before should be cut back to 6 in. or less.

SUMMER CARE

Roses properly planted in the Spring should break into leaf within a fortnight, and bloom in about ten weeks. They may bloom a little later than established plants or those planted in the Autumn.

Some writers advocate removing the flower buds from newly planted Roses to conserve the strength of the plant the first year. That is sheer nonsense. Allow the plants to bloom as much as they will. Cut all the flowers you want. I prefer leaving them on the bushes in order to save all the foliage possible for the plants' sustenance, but that is because I am interested in the strong development of the bush. Those who plant Roses only for flowers should be satisfied with their luck if they get a dozen good blooms from each plant. If the bush dies from cutting it so hard they have had their money's worth in flowers. If it lives and blooms another year it is so much velvet.

Cultivation

Hoe or cultivate the surface of the Rose beds once a week all Spring and Summer. Allow no weeds to grow and do not plant any other flowers in the same bed with Roses.

Mulching

If you have too many beds to cultivate so often, if you are more than commonly lazy, or if you have to be away from the garden for long periods, cultivation may be abandoned if the beds are mulched with some suitable material. Many things have been used for that purpose and others suggested. Probably the most widely used mulch is granulated peat moss. A layer of moss about 2 in. thick spread over the bed will do away with cultivating entirely. Buckwheat hulls may be substituted; grass clippings have been used; sawdust has been suggested, but a thick coat of manure is better than anything, except that it may be very weedy. Mulch paper has worked except that it is

a nuisance to put on the beds; tobacco stems have certain merits. The local source of supply influences the choice of mulching material to a large extent. Anything which prevents the evaporation of water from the soil, and hinders the growth of weeds is likely to be satisfactory.

Fertilizing

Roses planted in properly prepared soil do very well without extra fertilizing during the first Summer, but in the second year extra stimulation is needed, and it is difficult to avoid applying it to newly planted Roses at the same time. No harm is done by it and better flowers may result.

For established plants the best Summer fertilizer is liquid cow manure, made by steeping fresh cow droppings in water. If the ground is thoroughly soaked with rain the manure water can be used as strong as you like, but if the bed is dry, either water it heavily before feeding or dilute the liquid to the color of boarding house coffee.

Beginning when the flower buds show color, liquid manure may be given the Roses every fortnight until six weeks before frost, giving each healthy plant a half gallon at a time. Do not feed sickly plants.

Lacking cow manure, other farmyard products of similar nature may be used, but it is wise to use them weaker and in smaller quantities.

Chemical or artificial manures give satisfactory results if you are careful to follow the directions of the manufacturer. Do not experiment with larger doses unless you are willing to risk the destruction of your plants. The amount recommended is as large as can be safely used. Otherwise the manufacturers would advise using more in order to sell more.

Wood ashes are good for Roses if you have them from your own fireplace or brush fires. They are seldom worth buying. You can get potash cheaper.

Lime is good as an occasional tonic. Don't use it every year.

Experiment with artificial manures all you want to. It is an amusing pastime, and you may learn something, but don't use your whole garden as a test plot. Try your chemicals on a few bushes in a separate bed where it makes no difference if you kill them.

In spite of all that has been written and argued about fertilizers and mulches, the best fertilizer and the best mulch is continuous cultivation.

INSECT PESTS

Two kinds of insects attack Roses—aphides or plant lice, and chewing insects.

Aphides

These insects are familiar to all gardeners. They congregate in masses at the tips of the growing shoots and on flower buds so that the afflicted tips look mossy. You can squash these beasts with your fingers if you have only a few plants, or you can smother them with soapy or oily mixtures, and you can strangle them by paralyzing them with narcotics.

Nicotine sulfate in various commercial preparations is a good killer; Pyrethrum extract is also effective. The proper dosage is printed on the labels. Spray the affected plants three days in succession to destroy the eggs and nits.

Spraying for plant lice is necessary only when they are on the plants. You cannot prevent them coming or do anything about them unless they are there to kill.

Chewing Insects

Dozens of different caterpillars, saw-flies, Rose bugs, Japanese beetles, worms—green, red and woolly—all devour Rose foliage and flowers with the greatest relish.

Their appetite provides the method for their destruction. If we put poison on the things they eat, they die, to the cheer of the garden and to the benefit of the Roses.

There is no use putting poison on a plant after it has been eaten up by bugs. The time to do it is before the bugs sit down to their meal. This means that you must not wait until the insects are damaging your plants. You must have faith in their iniquity and take it for granted that they will come sooner or later.

Begin just as soon as there is anything on the bushes to attract an insect, and poison it. Spray or dust the foliage with arsenate of lead, or some other insecticidal poison, every two weeks from the time the leaves appear in Spring until they drop in Autumn.

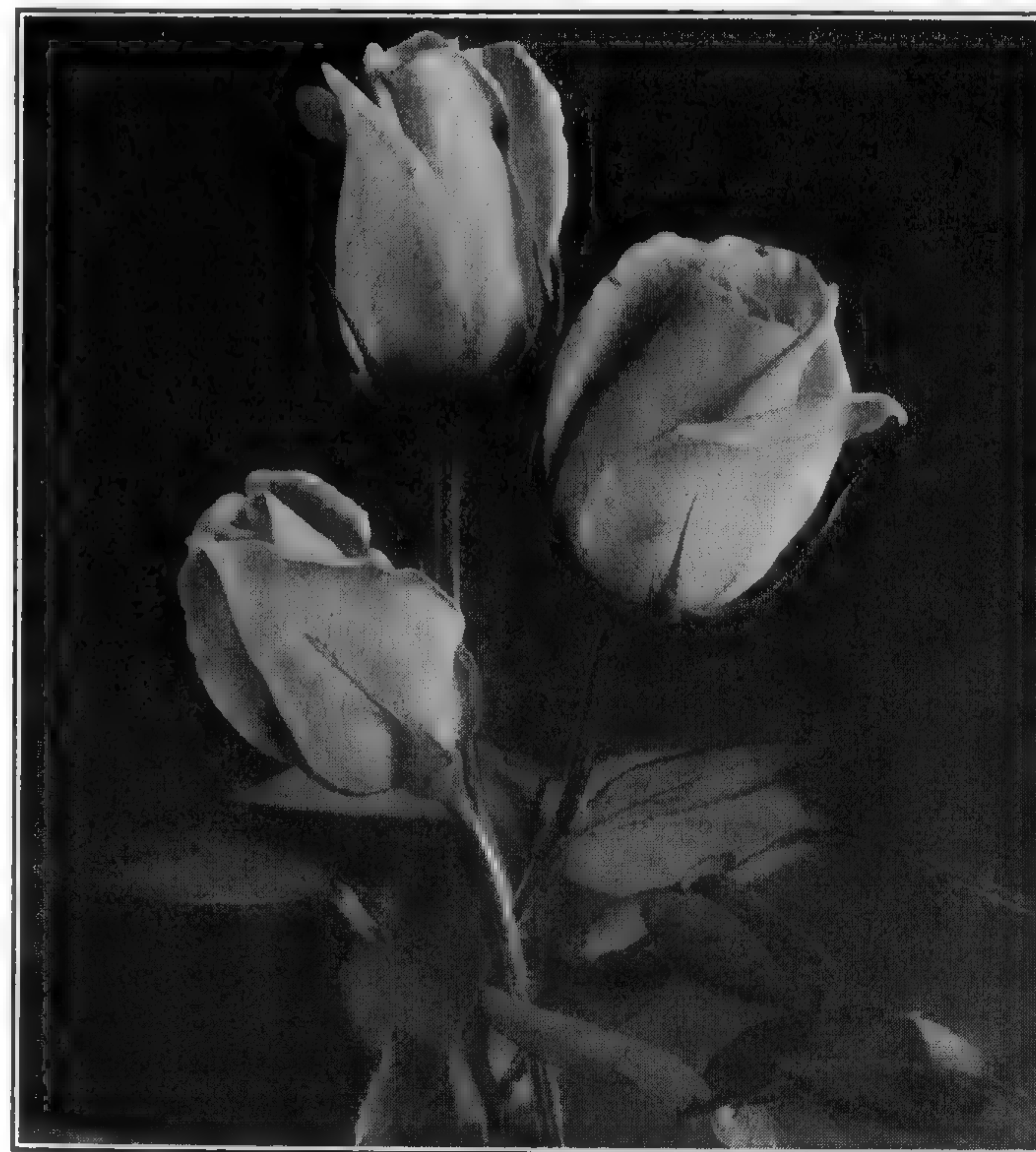
DISEASES

Roses like other living organisms get sick when they are attacked by parasites. There are three different kinds of diseases which afflict them.

Mildew

Mildew is a disease of the stems, flower buds and leaves. It looks like a powdery gray dust and the affected parts wither and shrivel. It is worse when the weather is wet and muggy, especially if hot days are followed by cold nights. Spraying or watering at night may induce it, but stagnant air causes most of it.

Mildew can be removed from Rose bushes by spraying them with a strong solution of baking soda, but that will not prevent it from returning.



Only plants free from disease and protected from insect attacks can produce buds like these

Black Spot

Black spot is a disease of the leaves. It begins as a dull, purplish black spot on the leaf, which spreads and multiplies, causing the leaf to turn yellow and fall off. It spreads with incredible rapidity, and can soon ruin an entire Rose garden.

While mildew is a disease on the surface of the leaf, black spot is a disease of the interior of the leaf. Mildew can be removed or cured. Black spot cannot. We also know that if the foliage is dry, black spot cannot spread, since it requires moisture in which to propagate.

Remedies

Both black spot and mildew are controlled by the same method. Dusting the plants every two weeks with a powder made from nine parts very fine dusting sulphur and one part of arsenate of lead is recommended by the American Rose Society's investigator. Dust very thoroughly so that all parts of the plant are covered. If it is possible to dust before rains, it will prevent the spread of the disease while the foliage is wet.

Bordeaux mixture, a common garden fungicide, is also useful but it discolors the foliage so badly that some gardeners do not like to use it.

Several other patented or proprietary remedies are on the market. Some of them are useful and a few of them are good. Their cost is the one great obstacle to more general use.

The important thing is that neither spraying with Bordeaux or any proprietary material, nor dusting with sulphur, is of any value unless it is thoroughly and regularly done. You must not wait for the disease to appear. You must get there first. Just as you must poison the plant before the insect eats it in order to kill the insect, so you must put your dust or spray on the plant before the symptoms appear, if you want to stamp out or prevent the disease.

Cankers

Occasionally discolored or dead patches occur on the stems. These are called cankers. Frequently, the canes look as if they had been burned by a hot iron.

All diseases, or injuries which resemble diseases, on the stems of the plant are dangerous. The best remedy is to cut the diseased stems away as soon as they are discovered and to paint the wounds with a disinfectant. Potassium permanganate is as useful and inoffensive as any. Spraying with Bordeaux mixture is also a good preventive.

CUTTING FLOWERS

There is no reason why Roses should not be cut whenever you want them. Hard cutting induces the plants to make new flower stems and buds. But if all the Roses are cut, the bushes remain small and unattractive. If a good looking bed of Roses is wanted in the garden, the flowers must not be cut so closely.

Disbudding

Many Roses produce clusters of buds, all of which will open, but if they are all allowed to do so, none of them will be very large or well shaped. If good blooms are wanted, remove all the buds except the most promising one, while they are still very small. The improvement in the size, shape and color of the flowers will justify the sacrifice.

Length of Stem

If cut flowers are the only object, take the blooms with stems as long as possible, but be sure to leave at least two leaves of the stem on the plant. Otherwise the plant will be starved for air, since it breathes through its leaves, and is likely to die. If a garden display is wanted, merely nip off the withered flowers without cutting the stems at all.

Time of Cutting

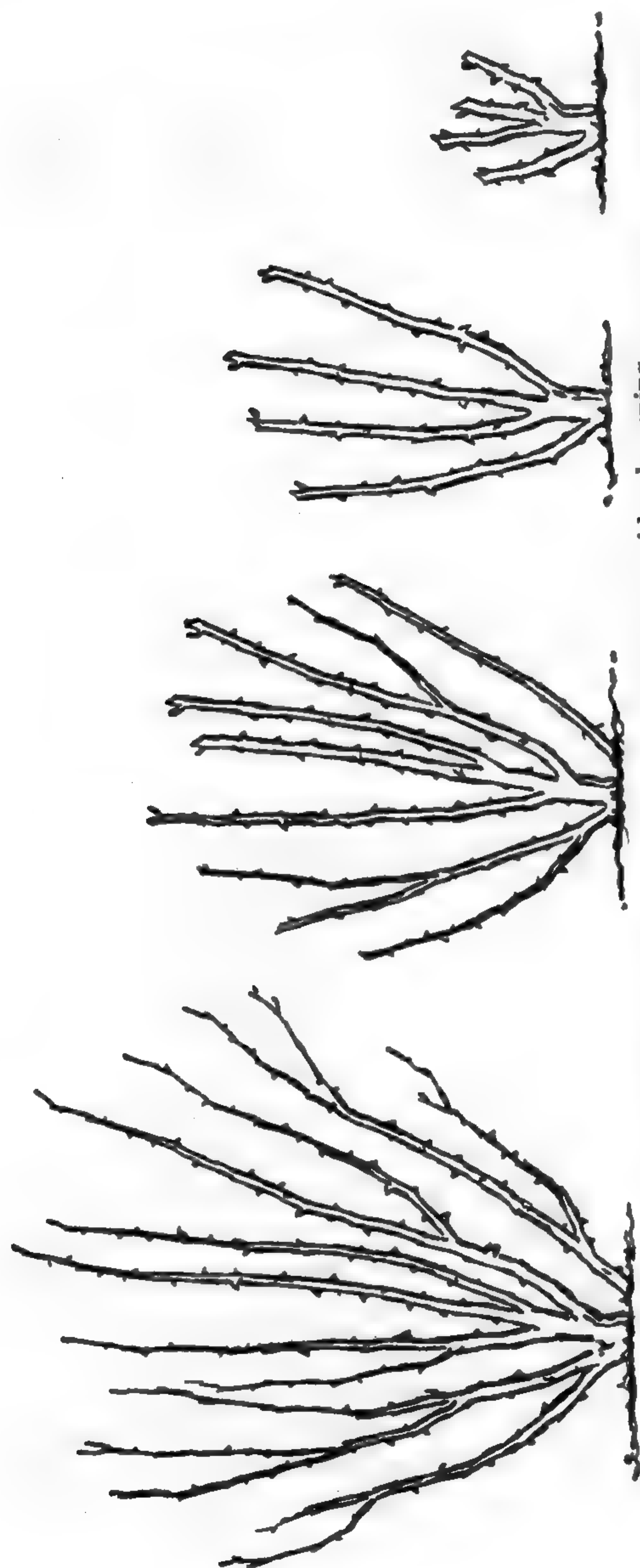
The best time to cut Roses is after sundown. Take a pail along and plunge them into water up to the base of the flower immediately. If the pail of cut blooms is let stand in a cool place over night the flowers will develop better and last longer. Roses may also be cut in early morning before the sun is hot, but cut at mid-day they wither quickly.

WINTER PROTECTION

Bedding Roses require protection from cold and wet during northern Winters, especially where zero temperatures are common.

The best protection is earth hilled about the plants as high as convenient, and the hollows of the bed filled with manure or leaves. The exposed tops may be covered with evergreen boughs, straw or any other light material, to keep off the wind and sun. Even if the exposed tops are killed to the level of the hilled-up earth, the bushes will renew themselves next season and bloom as usual.

Other methods have been used and suggested; all of them have worked somewhere for somebody. Use imagination, and whatever resources are at hand. The points to be considered are that Roses should be sheltered from continuous dampness and the roughest



A series illustrating the principles of light, moderate, and hard pruning
 From left to right: A Tea or Hybrid Tea before pruning; the same bush lightly pruned for garden decoration; moderately pruned to obtain a fair quantity of good flowers; pruned hard to obtain a few extra fine blooms

winds, and shaded from hot sunshine which is likely to thaw the frozen tissues too quickly.

PRUNING

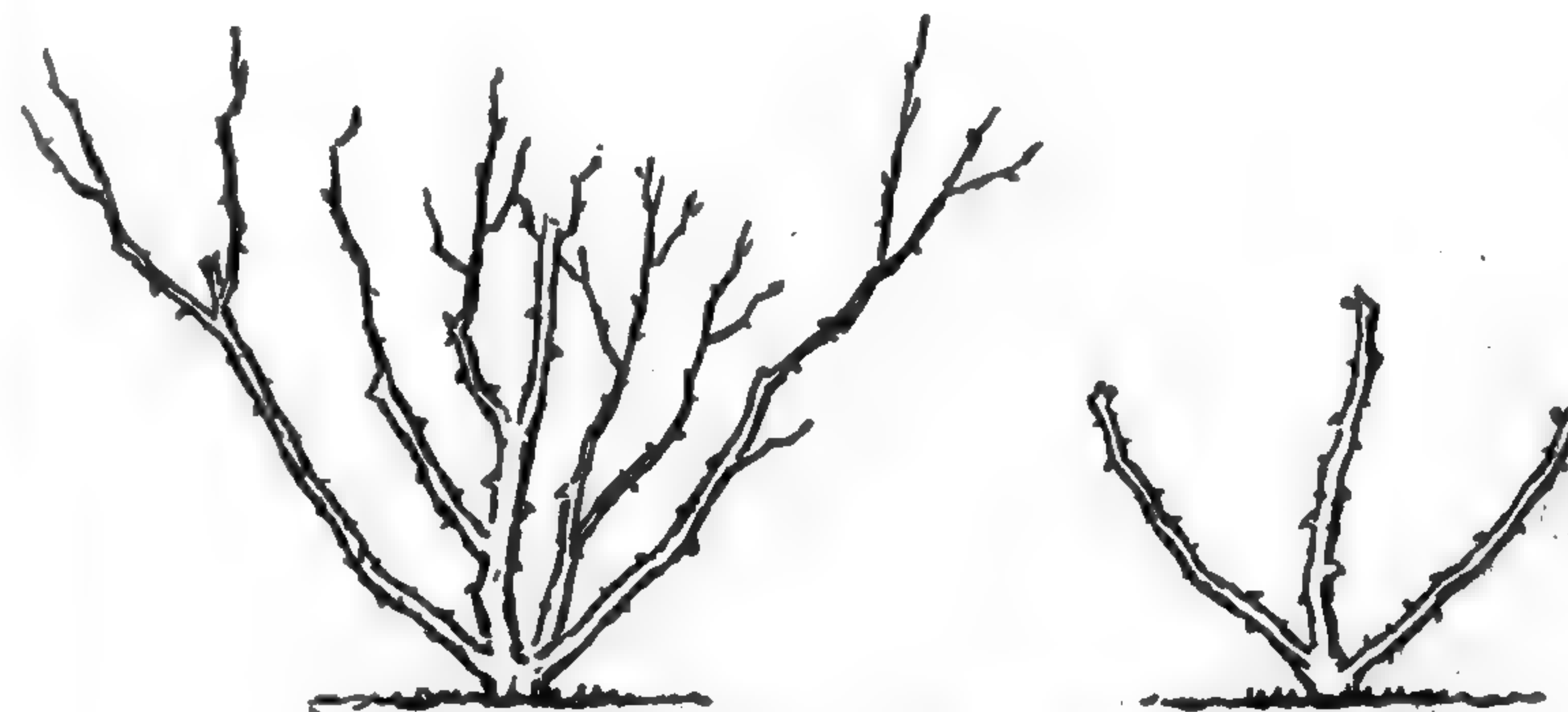
Most Roses are pruned in Spring for two reasons: to keep the bushes under control and to limit the number of flowers they bear. The fewer blooms that are produced, the better they are. Of course, anyone who is satisfied with thin rags of color instead of real Roses does not need to prune. A great many people are like that.

Hybrid Teas

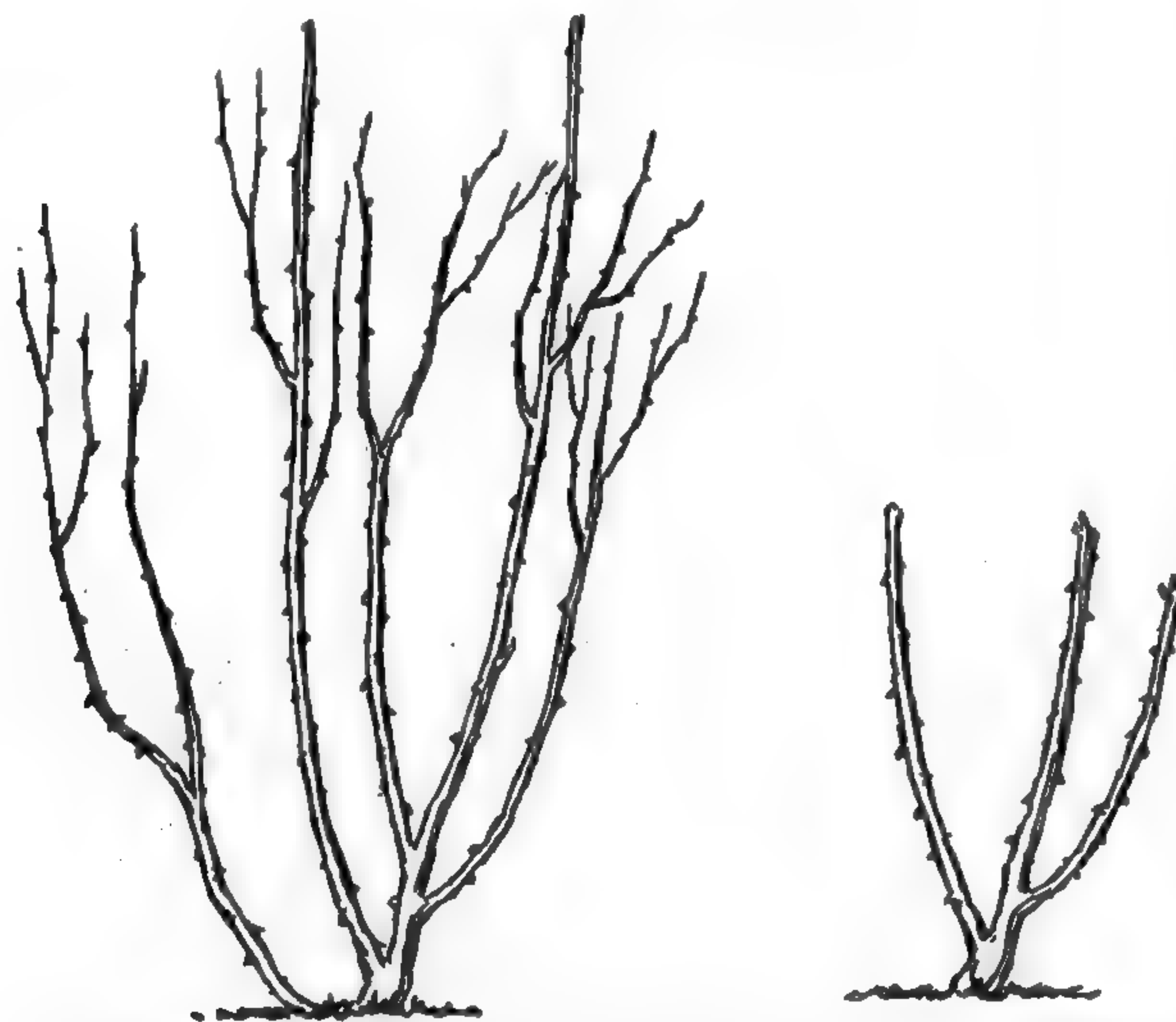
As soon as buds begin to break in Spring cut away all dead, weak and spindly growth from Hybrid Tea Roses, making clean cuts close to the main trunk of the plants. Shorten all remaining branches, according to what is wanted from them. The more wood left on the plants the more flowers will be produced. The harder the plants are cut back, the fewer and better the flowers will be. There is no limit. The bushes may be cut down to an inch high, and yet fine flowers will follow. They may be left 2 ft. high or more, but the blooms will be inferior. A middle course satisfies most people.

Other Bedding Roses

Hybrid Perpetuals can be pruned like Hybrid Teas, and Tea Roses rather less. Polyanthas and such types need only to be thinned out, although it will do no harm to cut them back severely if they are too big.



A Hybrid Tea Rose before and after pruning in Spring



A Hybrid Perpetual Rose before and after pruning in Spring

Shrub Roses

In Spring only dead stems and broken twigs need to be removed from shrub Roses. After they have bloomed, canes which are encroaching on the space of other plants should be removed, and the bushes trimmed into shape. It is better to cut out whole canes at the base of the plant than to shear the bushes all over as a Privet hedge. Treat them just as you treat Lilacs and Spireas.

Climbing Roses

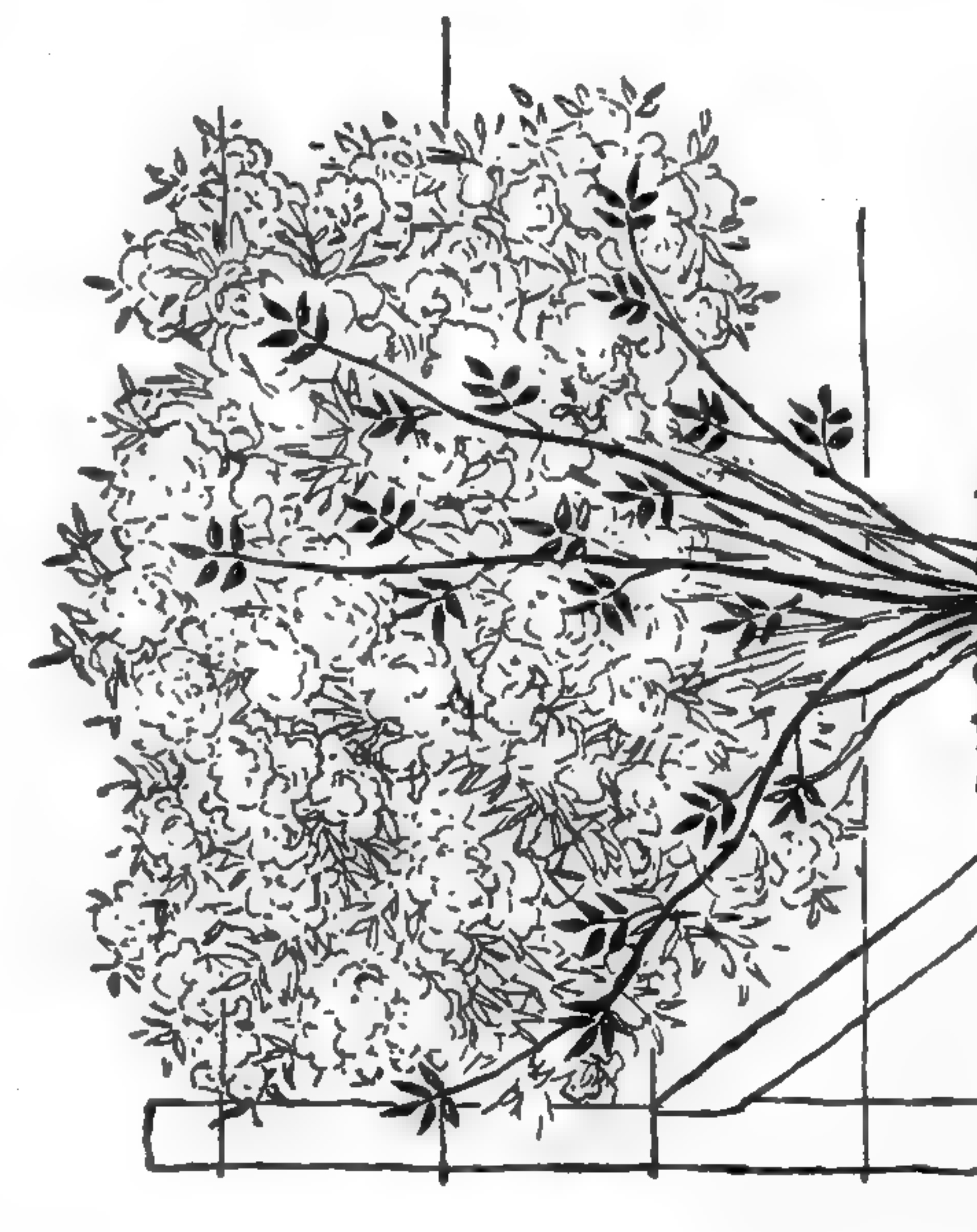
Climbing Roses ought not to be pruned in the Spring at all, except to cut away dead ends. After blooming, the long canes that bore flowers may be taken out, and the new vigorous shoots which are already pushing up from the root, trained to replace them.

Canes needed to cover the support should not be cut away unless new shoots are growing to take their places and large flowering, ever-blooming climbers get along very well with no pruning at all for many years.

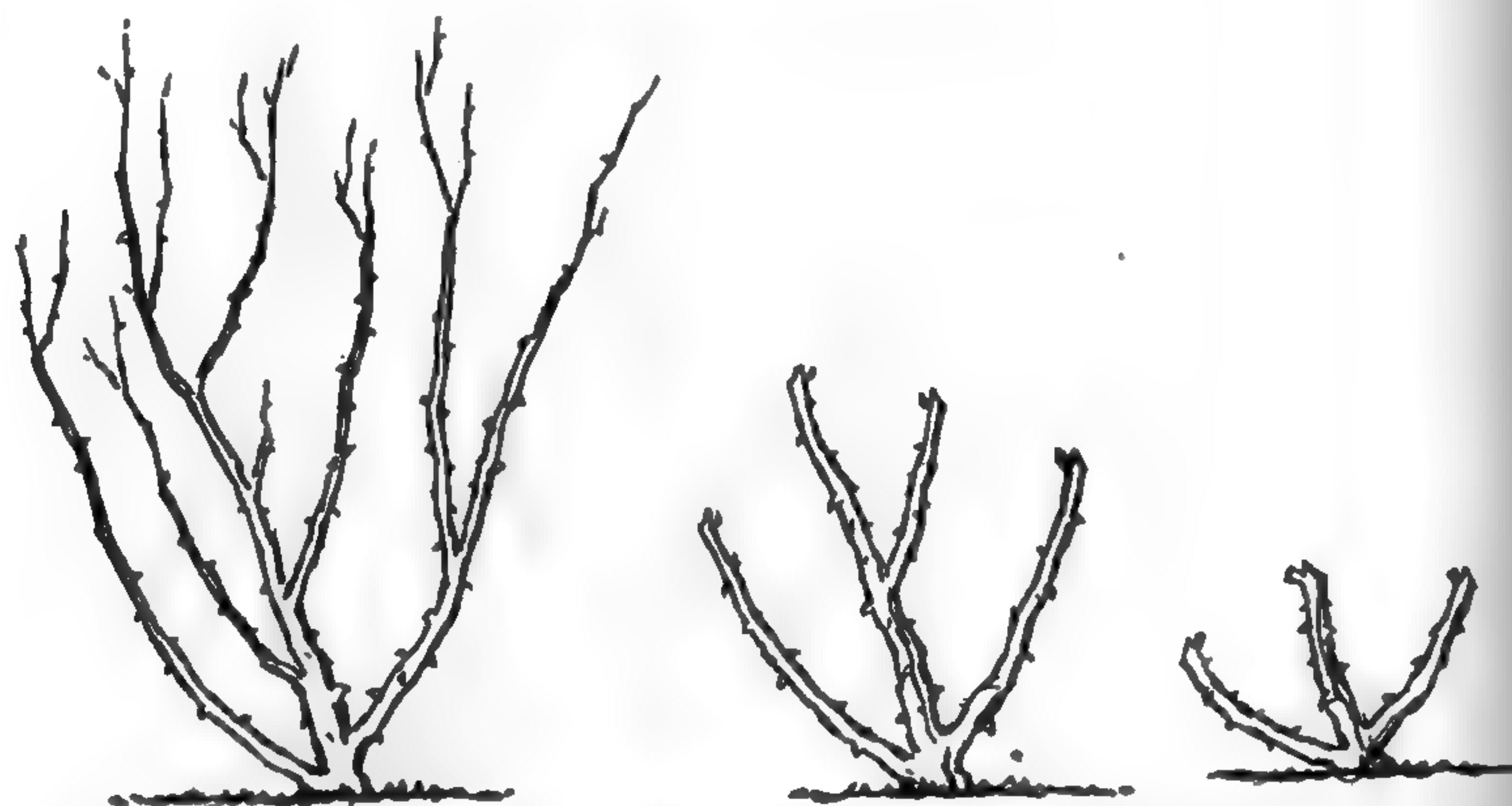
Anyone who studies climbing Roses will soon discover that they have different habits. Some bloom best on wood that grew last year. The best flowers of others are produced on older wood. It is the art of



The flowering wood and old stems cut away immediately after flowering, showing the new growth preserved and tied up



A Climbing Rose of the rambler type in bloom, showing new growth from the root



From left to right: A Rose bush as received from a nursery unpruned; pruned for planting in Autumn; pruned for planting in Spring

pruning to save the most wood of the age that produces the best bloom. Observation shows what to do.

Climbing Roses should always be tied snugly to their supports to keep them from slashing people in the face as they pass, or from tearing each other to pieces in the wind.

PROPAGATION

For commercial use practically all Roses are propagated by budding, although grafting is carried on to some extent with Roses intended for growing under glass. The practice of growing Roses from cuttings or slips to produce plants upon their own roots has fallen into disfavor because of the great length of time required to produce a bush equal to a budded plant in size and vigor.

Seed is resorted to only as a method of obtaining new varieties, except in the case of reproducing certain understocks upon which to bud special Roses.

The amateur who desires to increase the number of his Roses may use any of these methods, as well as several others. Climbing Roses especially, or bunch-flowered Ramblers, root very readily from layers and many of the shrub types can be propagated by division.

Budding is the most complicated of these processes. In its simplest form it consists of placing a bud of the desired variety upon the root of a strong growing understock which is denuded of its top after the desired bud begins to grow. The most useful understock for the

amateur is a species, *Rosa multiflora japonica*, which can be easily raised from seed sown in Spring or Autumn. When the understocks are about a half-inch in diameter at the surface of the ground, the earth is pulled away exposing a root-free neck in which a T-shaped slit may be made through the outer bark. Into the slit is slipped a bud cut from a half-ripened shoot of the desired variety. The slit is then bandaged shut with a piece of raffia or some other tie, and the bud allowed to unite with the stock. This operation is usually performed in the Summer or Autumn, and the bud remains dormant through the following Winter. In the Spring the top of the understock is cut away and the young bud allowed to grow.

Care must be taken in cutting the bud to make a thin slice of the bark with as little of the woody substance as possible. The best buds are found in the axils of the leaves about midway on the length of a shoot which has just borne a flower.

Cuttings of soft wood grow easily if inserted in moist, sandy soil in a shady place and can be covered with a glass for several weeks. Many people find it easy to root new plants by sticking the stems of cut flowers into the ground and covering them with a glass fruit jar. Climbing Roses grow easily by this method.

Late in the Fall cuttings of dormant wood may be made which will root during the Winter if planted in a well drained place. All such cuttings require several years to make good blooming plants.

Many shrub Roses and vigorous bushes send up suckers or offshoots which can easily be separated to make new plants, and drooping branches of climbing Roses may be buried under ground or weighted down with a stone or brick and will form roots within one season. Such rooted branches may be separated and the plants removed to a new location.

SUMMARY

Select Roses from the catalog of reliable nurserymen, having due regard for the purpose they are wanted.

Plant them in well fertilized ground, which is well drained and deeply dug.

Protect them from enemies, diseases, insects, rough winds, and severe cold.

Cut the flowers freely and prune the plants according to what they are expected to do.

Chapter VII

THE ROCK GARDEN

By ARCHIE THORNTON

Introduction—Situation and Aspect—Choosing Rock—Preparation of Mixed Earth—Regarding Construction—Rock Garden on a Suburban Lot—Excavating for Drainage Bed—Placing Rocks—Planting Material for Background—Concerning Plan—Considering the Actual Rock Plants

INTRODUCTION

Probably the most interesting feature about a rock garden is the fact that a greater variety of plants differing in stature, leaf and flower can be grown together in a given area than in any other phase of horticulture. Here we find trees in miniature, gnarled replicas of their older brothers, and bulbs such as Narcissus, Crocus, Fritillarias, Snowdrops and Tulips.

Then, too, ferns are not amiss in the shady parts and look so much at home when planted near water, be it a stream or a few occasional drops of water descending into the well-like pool below where birds drink and frogs pant in the Summer heat, while the actual rock plants clothe the nearby soil. All this can be had in the suburban garden.

SITUATION AND ASPECT

Don't decide to have some rock work under a large tree. In rainy weather the constant dripping of water from the leaves is likely to wash away much soil, exposing the roots and leaving them completely bare. Also, the tree's roots would soon find a kindly home in the construction that is made of specially prepared earth. Furthermore, the shade cast by the neighboring tree would soon cause the plants beneath to lose their true character.

The ideal situation would be in the open with the rock work running north and south. Such a location and aspect would provide the needs of sun and shade for a comprehensive collection of plants. No real importance need be placed on choosing a site. While there is an ideal situation, any location, if understood and studied, can be made suitable and choice of plants be made accordingly. In most cases the



Spring finds the rock garden in all its glory

item of where a rock garden is to be located would be out of the question, because the amateur gardener with his supposed suburban lot would have no choice. Make the most of the chances presented, study the situation and aspect, and plant subjects that will thrive and seem apparently at home.

CHOOSING ROCK

Here again, one may give consideration to the ideal rather than the necessity. Those pieces of water-worn rock, creviced and fluted, are the work of bygone ages and are individual pictures unto themselves; in capable hands they do make a rock garden that one can live with and love, yet their meaning is an artistic one and has little or nothing to do with the welfare of the plant. Collect pieces of rock that may be conveniently handled. Try and gather together some pieces that have distinct characteristics—marks of stratification or a nicely weathered appearance. Moss covered rocks are a snare and delusion and their beauty is transient. Generally they are collected among undergrowth in woods or along a shaded stream where the rock is certain to be charged with water. When these moss covered rocks are brought to light and placed in position on a comparatively dry mound of earth, their appearance tells a different story.

Oftentimes good sized lumps of split rock may be procured on state highways where construction is taking place. Don't let the appearance of split rock disappoint you; it probably looks hard and bald and quite unfriendly to plant life, but if it is near at hand and cheap, it is the gift of the gods. Should it so happen that the shape of the rock calls for the cleavage to come to the front and in full view, the cut surface can be made to take on a weathered appearance by rubbing cow manure on it.

PREPARATION OF MIXED EARTH

The majority of rock plants enjoy a soil composition that is fairly rich and porous, one that will retain just sufficient moisture and during rainy seasons will reach a point of saturation and allow the balance to pass through. A soil mixture made up of one-half loam, one-quarter leafmold, and one-quarter coarse sand, all thoroughly mixed together, makes an ideal one. What will come later will depend upon the individual kind of plant; catering for soil likes and dislikes—as instance the encrusted Saxifrage which will tolerate a neutral soil but will thrive

and be happy in a limey one. Likewise, the small Heaths will live in an ordinary soil but will gladly welcome the addition of peat.

REGARDING CONSTRUCTION

Rock gardening is a subtle art, differing from other types of gardening where all is in squares and circles and everything precisely mathematical. It would be most difficult, if not entirely out of the question,



Steps in the rock garden flanked with masses of *Aubrietias*, *Alyssums* and *Iberis*

to put down on paper an exact drawing of what the construction should be like on completion; that is, designating the exact place for each particular rock. Each site is a problem unto itself, the shape and contour of line of each rock playing a part. Yet, withal, the constructor should make an outline on paper of what he is striving to create, especially as regards the height in proportion to the width.

ROCK GARDEN ON A SUBURBAN LOT

We will suppose our site is in the corner of the garden where there is an abundance of sunlight and a free circulation of air, and we want just a small construction where we can have a touch of natural beauty

—something that Nature would claim as her own. Yet, in spite of the fact that it is to be a small rock garden, we will give every consideration to the construction as though it were a building of greater dimensions.

EXCAVATING FOR DRAINAGE BED

If the site chosen is one that becomes wet to overflowing during rainy seasons, an excavation should be made to a depth of at least 1 ft., or sufficiently deep to take the water that otherwise would surround the outskirts of the forthcoming rock garden. Place the earth to one side; if it is not too sticky, it can be of further use. Fill in the excavation to 6 in. with any material—brick ends or clinkers—that will render drainage. Over this place a thickness of Sphagnum moss, leaves or grass clippings. The earth taken out to provide the drainage bed should now be placed over the Sphagnum moss, raking it over in such manner as to give the desired shape, and remembering that at least 18 in. of the specially prepared earth has yet to come on top. The latter should be distributed so that it will be not less than 6 in. in front and increase in its depth until it reaches its highest point.

PLACING ROCKS

Now all is in readiness for the rocks. Don't overdo their use. Just a few pieces of rock look far better than too many. Too often an amateur rock garden resembles a heap of stones thrown in the corner.

In placing each rock ascertain which part has the most interesting character and present that to view. Bury the greater part of the rock so that when complete the construction shall be a mound of earth with elevations and depressions, the faces of the rocks jutting out here and there. Be sure that the rocks are firmly embedded and if their size warrants it, stand evenly balanced on each rock. Subject to one's weight, they should be made to lodge safely. The shrubs forming the background may be planted, but the rocks and the general bulk of earth must consolidate, and all should have a restful appearance before proceeding.

PLANTING MATERIAL FOR BACKGROUND

There are many beautiful broadleaf evergreens that can be used in forming a background valued for foliage and flowers. *Rhododendron carolinianum*, *Rhododendron catawbiense* and *Kalmia latifolia* make capital furnishings for a background, their density of foliage not only

giving an illusion of distance but their presence causing shade which brings out the coloring of the smaller plants before them. Try and plant in groupings of a kind rather than singly. Planting three *Kalmia latifolia* to form a comparatively bold group is far more effective than two of one subject and one of another.

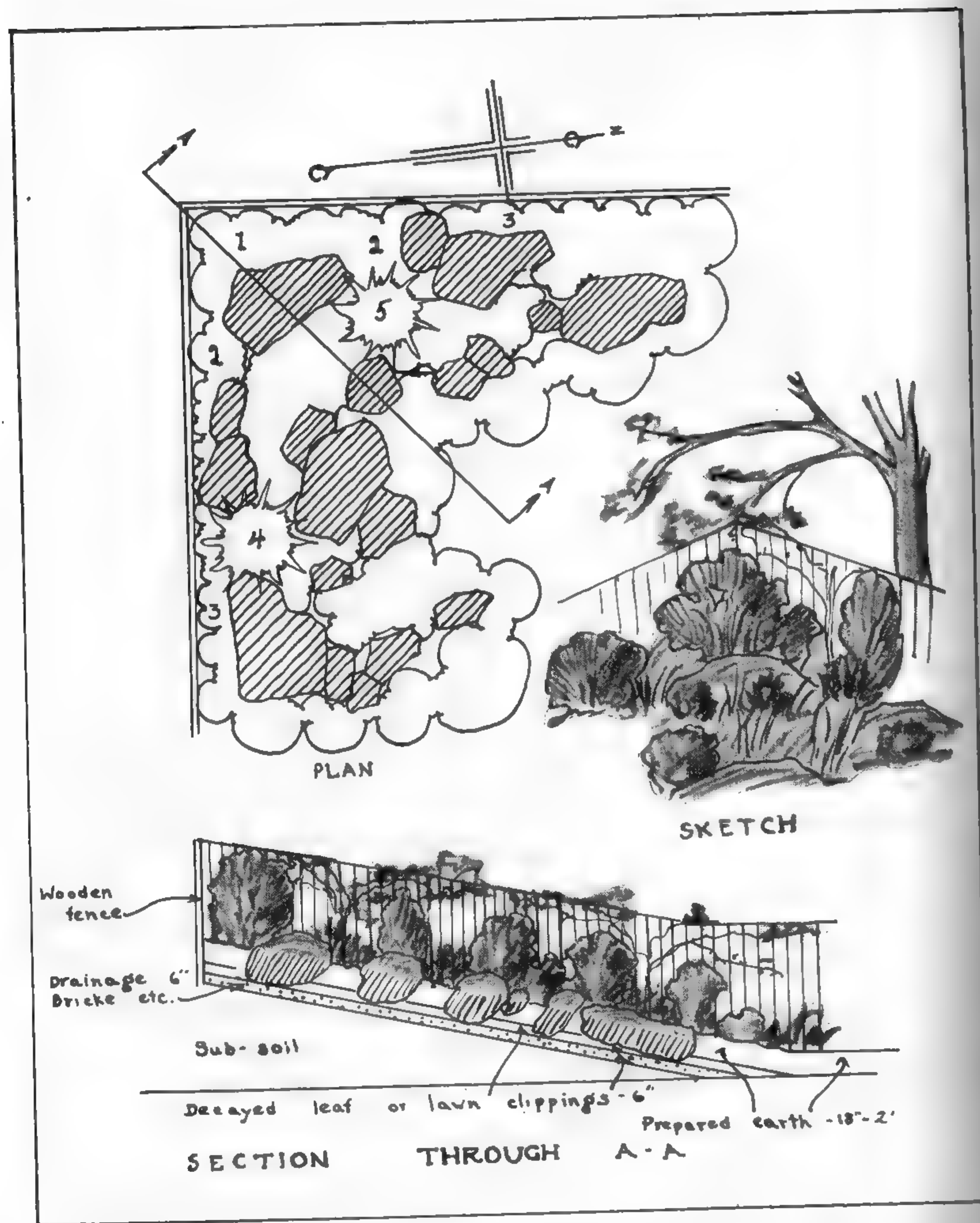
CONCERNING PLAN

Number 1 on the plan shown on page 98 represents three *Rhododendron catawbiense*. These should be planted in close proximity to the rock in front but sufficient space should be left for the planting of a few *Erythroniums*, *Narcissus* or the like. In space number 2 three small Carolina *Rhododendrons* may sprawl their lateral branches at will. Number 3 is represented by three *Kalmias* on each side planted in an irregular line, the middle one being brought out from its neighbor toward the center of the construction. All subjects are ericaceous—peat loving—and well decayed leaf or peat should be mixed with the earth at the time of planting.

Two small coniferous evergreens are represented by numbers 4 and 5. There is quite a choice of variety among this class—upright, prostrate or rounded. All have their uses. Number 4 could well be the Mugho Pine (*Pinus montana mughus*)—loggy and squat. Number 5—upright and soldierlike—the Dwarf Alberta Spruce (*Picea glauca conica*). None of the subjects chosen are fast growing. One should make a choice of nursery plants, the heights of which are in accordance with the size of construction, as considered for an immediate few years. Where one is desirous of using prostrate coniferous evergreens, choose small specimens of slow growers; for instance, Sargent Juniper (*Juniperus chinensis sargentii*) or the Waukegan Juniper (*Juniperus horizontalis douglasi*). Plant at the back of a rock tilted forward so the plant's energy may be exerted over same and also to economize on space. When all plants are in the ground give each in turn a thorough soaking.

CONSIDERING THE ACTUAL ROCK PLANTS

The chief difficulty in planting the small rock garden is the uneven rate of growth of the different plants. Those fast growing and of a trailing nature should be planted toward the front of the rock work, permitting their growth to go forward on to the pathway. Sufficient space should be given between the individuals for them to attain their maximum amount of growth and to go forth with their full beauty.



Plan for a rock garden

(For key to numbers, see page 97)

The rocks should be buried for the most part with only their faces exposed. The planting of evergreen and deciduous shrubs near to a rock not only economizes space but insures coolness at the roots

Hardy plant catalogs are full of perfectly good plants and one cannot go amiss by making a selection from the lists of one's local nurserymen. "Local" is used advisedly, for it will, in a measure, overcome a question of the particular plant. The world over there are certain genera which will always remain "the most important." These possess a spreading growth and furnish garish colors by the square yard, which counts for much in this peacock world of today. The most common of the floriferous genera is *Phlox subulata* whose color range includes pure white, pink, deep rose, mauve to a pale blue. Likewise the *Aubrietias* contribute much of the coloring to the rock garden in its season, especially tones of blue, mauve, and lilac. The genus *Alyssum* supplies two good yellows, a lemon and an orange, while the *Iberis* is the purest white one could wish for. In filling in when the main planting is finished, there are two genera which are indispensable; namely, the *Sedums* and *Sempervivums*. For the year around effect, both furnish a most interesting arrangement of leaves. They love dry, hot, sunny crevices where it is difficult to get other plants to grow and look happy and self satisfied.

For a complete work on the subject of this chapter we recommend

ROCK GARDEN PRIMER, by ARCHIE THORNTON

Written with particular regard for the benefit of those who require information on every minute point connected with the making of a rock garden. Amply illustrated with teaching diagrams and reproductions from selected photographs

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Chapter VIII

THE WATER GARDEN

By ROBERT V. SAWYER

**Hardy Waterlilies—Building the Pool—Tropical Waterlilies—
Lotus or Nelumbium—Victorias—Miscellaneous Water Plants**

WATERLILIES have become just about as familiar as Roses or Dahlias, though there may still be a few gardeners who think of water plants as having an element of mystery. Their cultivation is on a sure basis and, in general, they are not very different from other flowering plants. Water plants fall into five different classes; namely, Hardy Waterlilies, the Tropicals, Lotus, Victorias, and the miscellaneous or lesser aquatics.

HARDY WATERLILIES

Of the whole group the Hardies are the most satisfactory of all, though a few gardeners will insist on the Tropicals for first place. The Hardies have a long blooming season of about four months; they are ideally adapted to our climate; and they come in all colors except



Children and Waterlilies must have been made for each other



Nymphaea Mrs. Edwards Whitaker

Lovely sky blue flowers, spectacular in their giant size, yet dainty and graceful

blue. Some of them are highly fragrant. To grow them, the best soil is a mixture of one part well rotted cow manure to three parts clay or clay loam. Each plant should have from one to two bushels of this soil. The soil may be either confined in a box or basket or it may be loose on the bottom of the pool. Each plant should have about a square yard of water surface. As to depth of water, from 8 to 18 in. is all right. Always choose a sunny location for the pool, for none of the water plants like shade, though most of them will tolerate it for half the day.

The easiest way to winter Hardy Waterlilies in Northern parts is to leave the pool full of water and cover it over with boards and straw or other mulch. However, in a reinforced concrete pool in which the water is fairly deep over the plants, nothing need be done.

Hardy Waterlilies should be divided and given new soil every year, or if they are in a very generous amount of soil, every two years. This work is best done in late April.

BUILDING THE POOL

Of course, the first item is to build the pool. The easiest and cheapest pool, which has proven entirely satisfactory, is one made round or oval, bowl shaped, with a concrete wall only one inch thick. Simply scoop out a bowl-shaped depression in the ground, 30 in. deep and 6 ft. across and line it with an inch of concrete. Use a one-two-three mixture; this means one part cement, two parts coarse sand, and three parts gravel or crushed stone. For the 6 ft. pool it will take one bag of cement, two bushels of sand, and three bushels of gravel. Multiply this by four for the 12 ft. pool. The next day brush the concrete with a mixture of cement and water, mixed about as thick as heavy cream. This is the waterproof coat. Never put rocks or cobblestones in the wall of a pool below the water line, for the joint always leaks. These pools have no drain or filler pipe. The pool is to be filled from the garden hose and it can be drained by the same hose as a siphon, or else bailed out with a bucket. Pipes cost many times the price of the pool and are not really necessary.

These eggshell pools seem very fragile, but in actual use they have stood up dependably through very hard Winters. Of course, they were protected by the use of boards and straw.

TROPICAL WATERLILIES

There are some Waterlily lovers who claim that Tropicals are the supreme subjects of the whole aquatic group. Certainly, Tropicals do have superior size and fragrance, and they do supply that choicest of all colors, blue. Some of the truly giant ones, like Mrs. Edwards Whitaker, General Pershing, and O'Mara, if given everything their own way, have been known to throw 16 in. blooms on plants that were 20 ft. across, the leaves being 30 in. Of course, this is extreme success, but any one can grow 12 in. flowers.

The Tropicals will not stand cold weather and are to be considered as annuals. They are not to be planted out until June. They like shallow water and full sun. Give them the same soil as for Hardies, but more of it, if you want to grow giant specimens. For full size allow nine cubic feet of soil per plant. In the small pool, however, where each plant has a bushel of soil, the effect will be entirely satisfying. Trop-

ical day bloomers come in shades of blue, purple, pink and white. About half the varieties are richly fragrant. Night bloomers come in white, pink, and deep red. As far north as Cleveland the deep reds are doubtful; farther south they are fine. The whites and pinks, though, are pretty certain to bloom. All of the night bloomers are husky growers, too big for tub culture. The day bloomers, on the other hand, are more philosophic and adaptable about growing to fit whatever size container they are in. Any of the day bloomers will do for tub culture.

In choosing Hardy Waterlilies for tubs, any of the dwarf and half dwarf varieties are suitable. In general, though, tubs are too small and do cramp a plant's style. When concrete is so inexpensive and easy, why fuss around with tubs that are only half satisfactory?

LOTUS OR NELUMBIUM

The Hardy and Tropical Waterlilies are uniformly satisfactory and are safe ventures for the beginner, but now we come to a group



Yellow Marliac *Nymphaea* (*N. marliacea chromatella*)

This is one of the dependable old-standby varieties—hardy, robust and prolific

that is one hundred per cent capricious and uncertain, quite as liable to succeed for the novice as for the old time expert, and pretty certain to drive both to distraction; namely, the Lotus or Nelumbium. These plants have leaves that look like giant Nasturtium leaves. Some of them float and others stand 5 ft. out of the water. The flowers are as large as a man's hat and are produced in shades of white, pink, red, and pale yellow. The fragrance of this bloom, if such it can be called, is the oddest of all; it smells like a doctor's office. The plant has no definite crown but rambles all about in a running root. Lotus are certainly odd and beautiful plants and not really difficult if you discount the uncertainty. They are grown from seed or roots quite readily, though remembering that half the roots die when moved. The seeds should have a hole filed in their waterproof shell and should be planted in late May, in very rich soil in the shallow water of a warm, sunny pool. The roots are planted at the same time and in same location. Potted plants may be planted up to mid-July. One Lotus plant should have a wagonload of clay and manure to itself. Grow it in an individual 8 ft. pool or else confine it in a box this size. And confine it well or it will walk roughshod—if it walks at all—over your more conservative Waterlilies. You may get blooms in six weeks or you may never see one.

Six inches of water is enough for Lotus. Winter care is the same as for Hardy Waterlilies. Do not, under any circumstances, disturb Lotus roots in Fall or Winter for it will kill them every time.

VICTORIAS

The Victorias are the giants of the aquatic family. They have leaves like giant pie pans, 7 ft. across. They are completely tropical and in the Northern States are a greenhouse proposition entirely. However, the Cruziana variety, when it is available (it seldom is), will grow well as far north as New Jersey if the Summer happens to be extra hot. But there are a lot of greenhouses where the more tropical Regia could and should be grown, but it is not. It can be grown in a 15 ft. tank with only slight crowding; in a 20 ft. tank it will do perfectly. It would only occupy the tank from June to October and then the tank could be drained and used as regular bench space again for the Winter.

Barring the need for a high temperature (80 degrees F.) Victoria regia is not difficult to grow. The seeds are started in any rich soil under water in February. The seedlings offer no special difficulties,

grow rapidly, and surely with very few losses, until by June the leaves are as large as dinner plates, when the plant can be given its final location in the pool where it is to mature. If you have a large greenhouse, by all means give this elegant plant a thought.

MISCELLANEOUS WATER PLANTS

The next class takes in quite a number of moisture-loving flowers. Some grow right in the water, such as Water-hyacinth, Waterpoppy, Parrotfeather, Papyrus, Cattail, Bulrush, Floatingheart and many others. Some grow at the water's edge in the mud, such as Japanese Iris, Siberian Iris, Yellow Water Iris, Water Forget-me-not, Marsh-mallow and Lythrum. All these plants are pretty and desirable, so far as there is room for them. All of them need rich garden soil. The only care most of them need is that of keeping them within bounds.

By all means get acquainted with water gardening. Pools are easy to build and water plants and fish afford a lot of pleasure and enjoyment. And don't be afraid of mosquitoes, for the goldfish will take care of them.

*For a complete work on the subject of this chapter,
we recommend*

WATER GARDENS AND GOLDFISH

By ROBERT V. SAWYER and EDWIN H. PERKINS

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Chapter IX

MAKING A WILD GARDEN

By FRANK C. PELLETT

Spring Flowers Particularly Attractive—Location for a Wild Garden—An All Season Wild Garden—Transplanting—Plants for Shade and Sun

PERHAPS no phase of gardening offers more of interest or requires more of skill than the wild garden. If the right kind of plant association is established, under correct conditions, it will continue to flourish for a long period with little attention.

Such attractive native plants as thrive under a wide range of conditions—the native Columbine, some of the Blazing-stars, numerous Iris, the Gaillardia, Purple Coneflower and others—have long been included in common flower collections. These plants require no special attention; they will grow where common garden flowers succeed.

There are many others, however, which require special kinds of environment. They must have the right kind of soil, the proper amount of shade and correct moisture conditions in order to succeed. Because they are not easy to grow, they have been too long neglected and many are becoming rare in the wild state. The gardener who will give attention to the needs of these peculiarities may surround himself with plants quite different from those to be found in his neighbor's garden. It should be borne in mind that proper account must be made for differences in locality. In the Middle West, for instance, where the humidity is low and the Summer season at times is extremely dry, some plants succeed only in deep shade, whereas, in the more humid climate of New England these same plants will grow in open sun.

SPRING FLOWERS PARTICULARLY ATTRACTIVE

The dainty Spring flowers of the woodlands offer special attractions for the wild gardener. Trilliums, Dutchmans-breeches, Blood-roots, Springbeauties, Toothworts, Adderstongues and the various species of Ladyslipper are unlikely to succeed except under conditions similar to those in which they are found in the wild. They need

shade, moisture and plenty of rich leafmold. Such plants require good drainage in most cases. Standing water is fatal to many plants which do not thrive in excessively dry places. Even some of the bog plants can be given too much water. In nature, they are to be found on slight ridges or mounds which raise them above the water, but enable them to send their roots down into it. But few plants grow with their crowns below the water.

If one has a shaded spot, it is only necessary to add several inches of leafmold from the woods to make it ready for the plants. If this is not available, the leaves should be raked up in piles in Autumn and spread over the ground to be used for a wild garden. Several years must pass before one can establish sufficient leafmold from the natural decay of the leaves. To get immediate results one should get some bales of peat from the florists' supply houses. Spread the peat evenly over the ground and dig it into the soil with a spade. Since peat is partially decomposed vegetable matter, the gardener can readily establish conditions which are similar to those of the woodland with



Dutchmans-breeches requires shade, moisture and plenty of leafmold

its carpet of rotting leaves. Either peat or leafmold will hold the moisture and neither will dry out quickly.

LOCATION FOR A WILD GARDEN

In driving along an average street, one sees dozens of odd corners which would be ideal for wild gardens. The north side of a house where there is but little sunshine may be a spot bordered with trees or shrubs which would serve admirably.

It is difficult to establish such a garden under the shade of Maples. Elms are also surface feeders and drink the last bit of available moisture in dry times. Deep rooting trees like the Oaks and Walnuts are better. However, one must usually make the best use possible of what one happens to have and so a selection of plants can be made that is best suited to the conditions with which one must work. After all, there are native plants suited to almost any kind of environment and it becomes a fascinating pursuit to seek out the right plant for every available spot. Some woodland plants will tolerate an open, sunny position if their roots are shaded. Some bog plants will grow in almost any well drained garden soil which is not permitted to get too dry. If one has an exposed bare spot which is barren of loam, he must seek out the kind of plants which in nature grow in that kind of situation.

AN ALL SEASON WILD GARDEN

The most interesting wild gardens which I have seen are those making use of the early Spring flowers from the deep woods. However, these bloom only for a brief period and even the foliage of most of them soon disappears. It is accordingly necessary to combine them with something which will be attractive for the remainder of the season. Ferns serve very well for this purpose. They are rather late in coming to maturity and there is time for the blooming of the Spring flowers before they begin to crowd the bed. Another satisfactory solution is to use a ground cover such as Periwinkle or Wildginger to occupy the space after the flowers are gone. Wildginger is a very interesting native found in deep shade in moist woods and it is a very desirable addition to any garden.

I would not advise starting with Dutchmans-breeches, Adders-tongues or Springbeauties. These may be added after the bed is established and it is apparent that wild conditions are approximated. As soon as the bed is made, I would plant Trilliums, Hepaticas, Bluebells (*Mertensia*), Violets and Wildginger. The Trilliums and Blue-



Wild Sunflowers are desirable for open places where rank growth may be permitted

bells will disappear soon after blooming, but the others will remain green and make an interesting bed throughout the Summer. Naturally, one will not be satisfied for long with such a short list of wild flowers. There is an unlimited variety which may be added as fast as one understands the peculiar needs of each. The danger is that one will go too fast and waste much valuable material by trying to grow it in a situation for which it is unsuited. Uncounted millions of American wild flowers have thus been destroyed.

It is better to confine one's interest to the groups which one is best prepared to manage and increase the variety. The large flowered Trillium is the most desirable and the easiest to grow in the wild garden. If one succeeds with that he may well try the other eight species common to the Eastern States and some from the Pacific Coast. Violets are easy to grow and there are more than eighty different kinds of native Violets.

TRANSPLANTING

Great care should be used in transplanting. It is very important to make sure that a newly planted wildling is kept moist until it is

fully established. It is possible to transplant many things in Mid-summer if sufficient care is given. Take up as much earth as possible with the roots, and water freely when resetting. If set too deep, failure will often result, as it will if set too shallow. With many wild flowers the crown or buds to form next Spring's flowers should be just below the surface of the ground. If set too deep these buds may rot.

PLANTS FOR SHADE AND SUN

Plants moved south will need more shade or those moved north less shade than they are accustomed to, to adjust to climatic change. Many plants are tolerant of a considerable variation in environmental conditions, while some will not stand any considerable amount of change. Since no two species of plants are alike in their requirements, one can only learn by careful observation and experiment.

Among the plants which are easy to establish in shady places, one should not overlook the Violets, Wild Phlox, Solomonseal, Jack-in-the-pulpit, and Snow Thoroughwort. This latter plant is a tall growing one which blooms in late Summer and is commonly known by the name of White Snakeroot or Wild Ageratum.

For open situations where rank growth may be permitted, the Goldenrods, Cup Plant and Crownbeard are very desirable. The Milkweeds and many of the Wild Asters also have distinct possibilities for such a situation. Other plants to consider are Yarrow, the Everlastings, Wild Sunflowers, Wildbergamot, Yucca, Spiderwort and the Coneflowers.

Since there are so many hundreds of native plants from which to choose, but a mere glimpse of the subject is possible in the space here available. Once the gardener is started in that direction he will wish to make a special study of the peculiarities of the native plants and the conditions under which they will succeed. It is a hobby with unlimited possibilities.

*For a complete work on the subject of this
chapter we recommend*

FLOWERS OF THE WILD, by FRANK C. PELLETT. With more than 100 illustrations from photographs and six color plates, it is easy to recognize the plants. Their requirements are described in detail.

Secure this book where you bought your Garden Guide.

Chapter X

TREES AND SHRUBS

By S. MENDELSON MEEHAN

What to Consider in Choosing Trees—Plant Terms—Large Tree Planting—Making Use of Artistic Values in Trees—Why Plant Evergreen Trees?—The Right and Wrong Use of Weeping Trees—Planting Distances for Trees—Rapid Growing Trees—Nut and Fruit Trees for the Lawn—Ornamental Flowering Trees—Ornamental Fruiting Trees—Trees from the Wilds—Trees Immune from Pests—Low Branching Trees—Hardiness of Trees—Street and Avenue Trees—Evergreen Shrubs—Deciduous Flowering Shrubs—Massing Shrubs—Ornamental Berry Shrubs—Hedges—An Outdoor Living Room

THOSE of us who have grown up amongst trees have a searching pity for those who have not enjoyed that familiarity. Our hearts echo the words of Joyce Kilmer: "I think that I shall never see a poem lovely as a tree." There are so many ways by which trees may enrich our lives, it would be impossible to number them. To realize how very necessary they are to our happiness and very existence, try to picture this earth without them. But we would have every one think of them, not in the abstract but as a living experience which we should learn to enjoy by frequent contact and interested study.

He who has planted but a single shade tree has brought down on his community an added blessing. Those who have grounds which are planted with artistic skill, even simply, have created a source of happy contentment which may be unconscious yet very real. Flowering shrubs and richly colored berry plants appeal to the artistic sense. Those who have sufficient land to afford the planting of many trees as specimens or in groves not only accomplish a most practical thing in helping to steady temperatures and provide necessary rainfalls, but they set up an endowment for future generations greater in value than any money foundation. It is to produce ageless trees which money cannot buy.

It is the author's hope that the contents of this chapter may have an influence beyond just the possibilities of one's own possessions.

You may not experience the maximum enjoyment to be had with trees from just those which you plant. Learn to know trees by sight. Go into parks and other public places where trees may be seen in maturity. There are many private estates where an interested visitor would be welcome.

WHAT TO CONSIDER IN CHOOSING TREES

Next to the house itself, the selection of a right tree for the right place is the most important consideration in home building. Occasional trees will be planted for quick and fleeting results, but most are expected to stand for generations. It is impracticable to "try out" a tree intending to put in another if the first choice is not satisfactory. Start right. Develop your own knowledge of trees if possible, but also confer with those who know—not just good gardeners, but those with undoubted tree knowledge.

There are at least five important questions:

1. Is shade important, or just a matter of ornament?
2. When full grown should tree be tall or low-spreading?
3. Will a certain type of foliage (broad or narrow) or tree with graceful habit better suit surroundings?
4. Should permanence be sacrificed for rapid growth?
5. Must certain trees be avoided for climatic reasons or as especially subject to pests? Adaptability to difficult soil conditions?

Perhaps one may worry too much about all these requirements, for even with the most careful selection, trees may not do just as we expect. Nevertheless, they are very important considerations for those who care.

To be specific with question 1, if shade is most important one would think of Oriental Plane, Ash, Soft Maple, Catalpa, Ailanthus, Cottonwood Poplar, or in southern parts Peppertree and Eucalyptus. For distinctly ornamental qualities, waiting until later years for shade, there are Oaks, Norway Maple, Linden, Cutleaf Birch, Hackberry, Sourgum, Sweetgum, Beech, Yellow-wood, Coffee-tree and Sophora.

Foliage type (3) is a matter of great interest. One should consider Honeylocust, Weeping Willow, Coffeetree, Cutleaf Birch and Sophora. Brilliant Autumn coloring is another foliage point. For this we have Sourgum, Red and Scarlet Oaks, Sweetgum, Sorrel-tree and Norway Maple.

There is opportunity in these questions for the display of good taste and artistic sense.

PLANT TERMS

All too frequently there is confusion leading to serious mistakes through the misuse of or failure to understand the term that applies to different classes of plants. To some all evergreens are "cedars"; herbaceous plants are "bulbs"; "shrubs" may be anything that is not a large

shade tree. The distinctions are easily grasped, and it will make conciseness possible if we start with a brief explanation.

TREES—Usually with leading single trunk growing tall.

1. Deciduous (leaves fall in Autumn).
2. Evergreen (leaves remain on plants indefinitely).
 - a—Broadleaf evergreen, as Holly.
 - b—Conifer, as Pines, Cedars, etc.

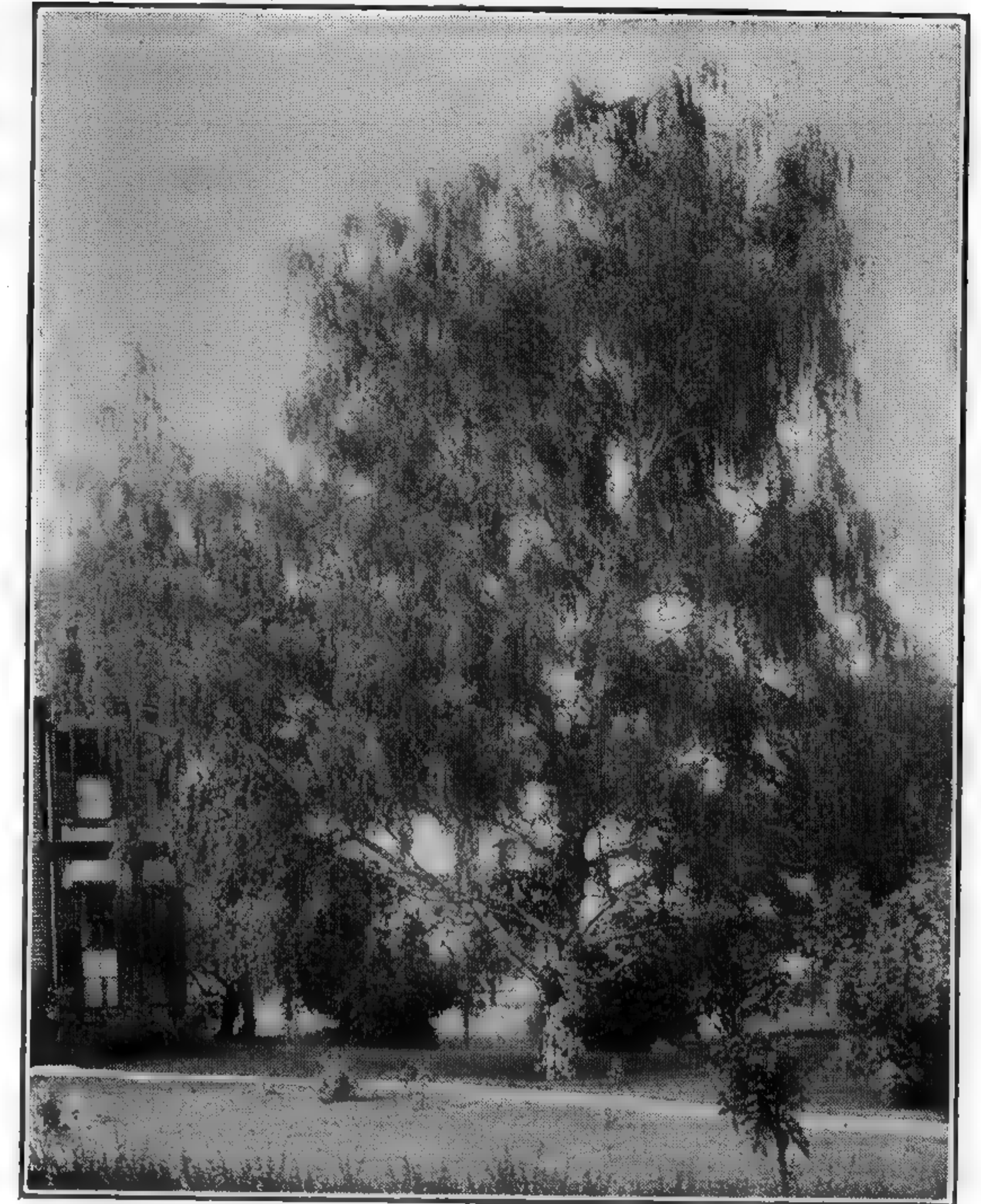
SHRUBS

3. Deciduous (leaves fall; usually flowering).
4. Evergreen (broadleaf type only, as Laurel).

HERBACEOUS PERENNIALS (permanent garden flowers).

BULBS, TUBERS and CORMS (as Tulips, Dahlias and Gladiolus).

There will be occasional plants hard to classify until one understands their individual characteristics. Japanese Maples may be small trees and almost shrublike. Some evergreen shrubs retain their leaves



Cutleaf Weeping Birch has a personal charm all its own

in more southern sections, and lose them in Autumn farther north. These are still known as evergreen because of the tendency. A few dwarf evergreen shrubs like Lavender and Daphne are commonly found listed among herbaceous perennials, because they are used together. These exceptions are few, and one may usually depend on the above analysis.

LARGE TREE PLANTING

The desire is often expressed to have young trees in order to experience the enjoyment of seeing them grow. That is a worthy idea and might well be followed in the main. But older trees have their value too. There are times when a small tree will seem so disproportionate. One may be planting for the future, and yet we live in the present. An artist does not paint a landscape over a period of years; he wants the scene in finished form as speedily as may be. Trees furnish the artistic elevations and the sky-line in a scene. Why set out shrubs that are fairly near their maximum height and yet plant trees that have many years to go before bringing symmetry to the assembly of plants?

One large tree may lift an entire scene out of the commonplace. A new house may have that obtrusive newness dispelled by three or four large trees judiciously located.

The frequent use of large trees moved with great balls of earth is a more modern custom. Suitable equipment for handling, and experienced workmen have made it possible to transplant with a large percentage of success. The moving of trees 5 to 10 in. in diameter and 20 to 30 ft. high is of common occurrence. Such work should never be put into the hands of poorly equipped men.

Good after-care of trees so moved is important but not difficult. In exposed situations where either heat or wind is excessive, it is well to wrap the trunk with burlap as high up as feasible, for the first year. The ground around the tree should be thickly mulched with peat or litter to conserve moisture. In dry times the ground should be flooded with water every couple of weeks. Draw the soil out from the tree to form a basin that the water may sink in.

MAKING USE OF ARTISTIC VALUES IN TREES

There must be a groundwork planting to every scene. Trees must be located here or there for balance or emphasis. But apart from that there are minor positions where one has more freedom of choice and arrangement. After all, it is touches like this that give individu-

ality and personal charm to grounds. The conventions are satisfied with the major plantings, and now you may pick, choose and place more as you will.

Perhaps a friendly sort of tree like Red or Swamp Maple would meet a desire. It is very leafy, and grows in a random sort of way. No two trees are ever quite alike, and the orange-red blossoms in Spring or the scarlet Autumn foliage may be depended on for a dash of brilliant color at those seasons.

The Honeylocust is not a tree to select for an important position, but set it where its soft, waving foliage may spread without cramping yet with a general background, and it has exceptional charm.

In complete contrast to the Locust is the Maidenhair-tree, or Ginkgo. Here is a novelty tree, unlike any other. It is either perfectly upright growing, stiff and unlike the Lombardy Poplar, or with branches shooting off at sharp angles in various directions.

Then one will choose a tree that is "pretty"—a flowering Cherry, or in southern sections a Crapemyrtle. It might be a Mountain-ash for its gorgeous red berry clusters. The Ailanthus, Koelreuteria and Sophora would give dry seed clusters that are attractive.

Plantings on this order can be done more leisurely, and one should be continually on the lookout for new ideas as he goes about. It is the beginning of a happy hobby.

WHY PLANT EVERGREEN TREES?

The addition of an evergreen tree (or several of them) to your tree plantation will be appreciated in due course, even though just now you incline to the ornamentals. They add both tone and color when all others have gone into Winter retirement. You may feel that they are too heavy for your home surroundings, but that is chiefly where they have not been well located, or perhaps because the number has not been in good proportion to the deciduous trees. No general planting should be without them. Evergreens with rich tones give relief to lighter vegetation; they add warmth to the Winter scene when in right relation to the surroundings. In climates where ice and snow are Winter visitors, evergreens laden with these elements are the fascinating features of a scene.

Be extremely careful how they are chosen and where they are placed in the first instance. Large growing evergreens may seldom be planted near the house. Evergreen trees may well form a group or background at a distance; or single specimens may be the attractive

solitaire in a setting of deciduous plants. The Austrian Pine, the Deodar Cedar, Hemlock, Blue Spruce and similar fine specimens are appropriate for these single plantings. Norway Spruce, Scotch Pine, Hemlock, etc., are better for massing and distant scenes.

Evergreens may develop into masterpieces of plant life, and are worthy of our deepest interest.

It may be well to consider evergreens from the standpoint of cost and value. They are, generally speaking, more costly than deciduous trees. This is easily explained by the fact that it takes a much longer time to rear them to a salable size. Pines, Hemlocks and certain of the Spruces grow quite rapidly, and cost proportionately less, but Firs and choice Spruces mostly grow but 6 in. a year. If this means ten years for a 5 ft. plant, it plainly cannot be sold for a small sum. Now it may not concern us much that a choice 20 ft. evergreen is worth a large sum, but it undoubtedly enthralls us to possess a fine evergreen that took say 40 years to attain such stature.

This little discussion suggests that one should not be too hasty in buying evergreens that happen to be offered at a cheap price. Be sure that you are getting your money's worth. The readiest example of such a possible error lies in the Blue Spruce. Such a plant, grown from seed, is a true Blue Spruce, but it will probably never be as beautiful a plant, color considered, as one raised by grafting. The seedling plant is cheaply grown; the grafted plant costs three or four times as much to grow. Koster Blue Spruce is by necessity grafted, so one is always safe in buying that variety.

Speaking of Blue Spruce leads into consideration of fancy evergreens. With some persons "blue" evergreens are taboo—contrary to Nature. But we will not agree that this is a reasonable position. Shades of green, gray and blue may readily be found in wooded places, and some blue is quite pronounced. In any event, much of the planting we do is on cultivated grounds surrounding homes and buildings where the conventional is expected to blend with Nature. Richly colored evergreens seem quite in place near the entrance to grounds, along the drive, and on the lawn.

There is a group of fine evergreens that might well be considered for companionship: The rich green Nordmann Fir, so substantial and trim; very slow growing, to be sure, and not easily had at nurseries. Oriental Spruce, variable in speed of growth, somewhat resembling Norway Spruce, but more refined. White Fir, *Abies concolor*, one of the handsomest. Douglas Fir, fairly rapid growing, lovely and soft to the

touch, a rather pale green, almost glaucous. Koster Blue Spruce, already referred to, a beautiful piece especially when surrounded by the preceding sorts. The Japanese Umbrella-pine, *Sciadopitys verticillata*, a rare and distinctive long-needed evergreen of distinctive character. *Cedrus atlantica glauca*, another decidedly blue evergreen, different from any other. Deodar Cedar, a graceful, rapid growing plant which reaches its northern limit about Philadelphia.

Another type of lawn specimen evergreen, more rapid growing than the preceding and less costly, is represented by certain of the Retinosporas. Unfortunately, Retinosporas are commonly used for bedding purposes, and do not have opportunity to develop as specimens. Indeed, they cannot be planted too widely in exposed places where strong winds may serve to give them a seedy appearance. *Retinospora obtusa* or Hinoki Cypress makes a splendid large specimen. The foliage may be described as resembling *Arborvitae*, but the larger growth is quite treelike in outline. Lawson's Cypress is not always very distinctive while young, but it will age into a striking specimen. *Libocedrus decurrens*, Incense-cedar, from the Northwest, is rare in the Eastern states, but it grows into a beautiful columnar tree of great height.

Among the Pines, the Austrian makes the best lawn specimen, by reason of its low branching habit and the symmetry of the whole. It may seem a little rigid to some. In contrast we have the Himalayan Pine, a large growing tree of the White Pine type, but with long curving needles. A well developed specimen makes a handsome figure. The Red Pine and the Hemlock must not be omitted, as they are excellent trees, well known and appreciated.

The list of smaller evergreens for groups and beds, corners and terraces is far larger, and infinitely more variable. One may acquire almost any form, color and variety of foliage, and arrange them to produce any desired effect. It will test the best that is in one, however, to make it permanently satisfactory.

Perhaps the most deservedly popular of such evergreens is the Japanese Yew, *Taxus cuspidata*, and *brevifolia*. For an upright variety, but full in form, *T. hicksi* is excellent. *T. brevifolia* is slow growing and used for bordering.

By reason of hardiness and steadfastness to certain form, Junipers are indispensable. The Chinese sorts, and the choicer forms of *Virginiana*, as *Keteleeri* and *Cannarti*, are the better kinds. Among the trailing Junipers, so very useful, some are so decidedly better than

others, they must be seen and identified with the intended purpose and not ordered by description. *J. horizontalis* is a popular sort.

THE RIGHT AND WRONG USE OF WEEPING TREES

Some of the most beautiful of all specimen trees may be found among those that are termed weeping or drooping. But to appreciate them fully, they must not be allowed to dominate a landscape. Nature only gives us forms like these casually, and in natural gardening we should continue the same proportions, and use the weepers sparingly. In gardens and formal areas, there is, of course, a special license to use anything that harmonizes with a set scheme.

One of the most drastic irregularities in plant growth is the Weeping Beech. Its branches droop in such an angular way as to make it a rather grotesque figure. But give it a good setting alone where one may admire it, just as he would a fine piece of statuary, and especially so when the tree gathers age and size.

More likely to harmonize with average surroundings are the graceful weepers like Cutleaf Weeping Birch, Weeping Japanese Cherry, and Willow. But even these should be carefully located with an eye to artistic results.



What a tree! The Weeping Beech is a near approach to a living fountain

There are large and spreading trees slightly pendulous like the Elm and Linden but they are not so individual as others.

Weeping Mulberry, Camperdown Elm and Kilmarnock Willow have their place, but are used so indiscriminately as to be a travesty on landscape art. The *Catalpa bungei*, though not weeping, might be classed with the foregoing as being used in faulty ways. They are all formal figures, and may only be used in those terms.

PLANTING DISTANCES FOR TREES

It is impossible to satisfactorily select and arrange a planting of trees without fairly well envisioning how tall and wide they will grow as the years pass. The tendency may be to overcrowd through not realizing the extent of growth, or, on the other hand, failing to realize how very long it takes for some trees to develop, and the immediate necessity for planting in such a way as to properly satisfy one's present needs.

The importance of correct decisions lies in both practical and aesthetic points. Some trees, if grown too close together, do not thrive. The branches, if shaded by adjacent trees, weaken and die. Others like close companionship through which there is mutual protection from extreme climatic conditions. With still others it is just a matter of symmetry and perfection. We cannot enjoy them if they are huddled together and symmetry and grace are lost.

Frequently there must be a compromise in distancing trees. Some large growing trees with unlimited space might ultimately spread their branches 80 or 100 ft. yet could be satisfactorily grown in half that spread.

The following table will be a fair guide:

Street trees.....	20 to 30 ft. apart	Flowering trees.....	25 to 40 ft. apart
Avenue trees.....	25 to 40 ft. "	Fruit trees.....	20 to 40 ft. "
Single lawn.....	40 to 60 ft. "	Evergreen trees.....	25 to 40 ft. "
Special large.....	60 to 100 ft. "	Near drives.....	6 to 15 ft. distant
Near house.....	6 to 15 ft. distant		

Pin Oaks with spreading lower branches and the larger weeping trees should have the maximum distances. So should Norway Maple, Red Oak, Soft Maple and Oriental Plane, for they grow full and spreading.

The Elm grows tall and spreads at the top, but where room is not plentiful it may have a medium distance, for it is companionable. The



The Pin Oak in all its beauty
As a street tree, even with the necessary trimming of its lower branches it is still imposing. Hard and long lived

same with Linden, Hackberry, Water Oak, and Horsechestnut. The Ginkgo, if developed as a spreading tree and not perfectly erect, may have medium spacing.

In warm, sunny climates, at least, Sugar Maples may have the minimum spacing. The Boxelder will be better that way.

For singles one may have Linden, Willow, Cutleaf Weeping Birch, Honeylocust, Yellow-wood and Sophora. Large pieces would embrace Beech, White, Red and Live Oaks and Elms.

Only trees that do not insist on spreading should be planted quite near buildings. The Soft Maple, Lombardy Poplar, Ginkgo, Elm and Sugar Maple are suit-

able. Never use Beech, Norway Maple or Linden. Near drives it is largely a matter of not having branches that will interfere with traffic. Some low-branching trees like the Pin Oak are very lovely by the drive if trimmed high.

RAPID GROWING TREES

These notes are written only for those who have the courage to remove a tree after it has served a purpose, and when to keep it longer would be disfigurement. A degree of impatience to have one's grounds set with trees in larger sizes is pardonable. It may be a real need for shade, or it may be an artistic sense craving for enough finish to gratify the eye.

If the reader has made careful use of the notes on "Planting Distances," it will be feasible to make additions to the permanent plant-

ing, locating some fast growing things between them, purposing to take them out years later when crowding begins. Orchardists make a regular practice of this kind of planting, though many try to keep the interspaced trees just a little too long. What would you do?

The following trees are good subjects to serve as fillers, the more rapid growing being named first:

WEeping WILLOW. A thrifty young tree will grow 6 to 8 ft. in one year. Tall and wide spreading. Likes moist soil, but grows almost anywhere. Locate on lower level if possible.

POPLAR. The Lombardy and Bolleana both grow perfectly upright as a spire. Cottonwood and Carolina make very large trees quickly. Easily broken in windy places.

PAULOWNIA. A striking tree because of its very large leaves. Very few side branches the first two or three years.

BIRCH. The Cutleaf Weeping is the faster growing. Light, airy growth, tall and fairly wide spreading.

SOFT OR SILVER MAPLE. A tree with many qualities for permanence, but its surface roots spoil lawns and its brittle branches break easily. Frequently best as a filler.

BOXELDER. A distinctive type of Maple. A low-headed, brittle tree with light green foliage.

LARCH. A deciduous conifer. Grows tall with fair spread. Winter aspects not always pleasing. Very effective when well located.

SIBERIAN ELM. Made popular in recent years. A rather handsome tree. Leaves small; growth light but abundant.

AILANTHUS. Especially good under difficult conditions. It will grow along while others are struggling.

TULIPTREE. A fine large tree, with straight, single trunk. This and the one next following should also be given permanent use.

ORIENTAL PLANE. Has the merit of growing all Summer long and getting ahead. A large spreading tree much esteemed.

CONIFERS

HEMLOCK. Too rapid at times, when it loses symmetry. Pruning in Summer corrects this.

NORWAY SPRUCE. "Christmas Tree" type. Must have rich, deep soil for the quicker results.

DEODAR CEDAR. Included here for very rapid growth, but not for temporary use. It is too handsome and valuable to be sacrificed.

WHITE PINE. Grows fast and large. Likes the coolness of mountainous country, and soil that does not dry out too much.

NUT AND FRUIT TREES FOR THE LAWN

Setting aside questions of economic values, let us pay worthy tribute to nut and fruit trees for their ornamental qualities. Why should they be less attractive just because their fruit happens to have food value? There are, indeed, some practical reasons against them. They dirty the lawn sometimes. Insect pests are more readily attracted to such trees, perhaps, and there must be spraying; leaves may get rusty. But oh! how well worthwhile some of them are. What

sturdy and rugged trees one gets from Hickory and Chestnut! How picturesque an old Apple tree well located! What can be lovelier than the pink flowers of the Peach, or the chaste pink and white flowers of the Apple? Add to these good points the pleasure of gathering the product as well, and one may well try to include them in a planting.

One of the nicest nut trees is seldom ever planted; it is mostly found in Nature. This is the Pignut, *Hicoria glabra*, a tree of handsome proportions and clean foliage. The Shagbark Hickory (*Hicoria ovata*) will be appreciated for just the opposite characteristics. It grows tall and rugged. The leaves are large, almost coarse, but seldom suffer from drought or insect attack. The shaggy bark on a large tree is a fascinating thing.

The Black Walnut is rather impossible for a good lawn, but the English or Persian Walnut, with its broad, pleasing green leaves and spreading head, is very acceptable. Not always hardy in northern parts, there are now improved varieties that will stand almost anywhere.

In Southern States the Pecan is used anywhere and everywhere. Improvements in variety and for hardiness make this now possible in more northern sections.



Bechtel Doubleflowering Crab is one of the better known of numerous varieties of exquisite flowering Apples

ORNAMENTAL FLOWERING TREES

Cherry blossom time at the nation's capital is a great annual event. Other localities have come into prominence for the lavish beauty of Peach or Apple blossoms in orchards. About Philadelphia, the people revel in the exquisite beauty of the Pink Dogwood, of which there are large numbers everywhere. But these are just popular phases of a continuous series of flowering trees from Spring until Fall. There are many splendid subjects not so well known, especially the later ones. One could devote an entire chapter to this subject, but we shall instead try to be brief and fairly inclusive in the following tabulation:

SPRING	Color	Size
Cherries.....	white, pink	medium
Apples.....	white, pink	large
Peaches.....	white, pink, red	medium
Dogwoods.....	white, pink, yellow	medium
Redbud.....	pink	medium
Magnolias.....	white, pink, red	medium
Norway Maple.....	yellow	large
Red Maple.....	red	large
Paulownia.....	lavender	large
Yellow Locust.....	white	large
Laburnum.....	yellow	medium
EARLY SUMMER		
Yellow-wood.....	white	large
Styrax.....	white	medium
Catalpa.....	white	large
MIDSUMMER		
Koelreuteria.....	yellow	medium
Cedrela.....	white	large
LATE SUMMER		
Sophora.....	white	large
Franklinia.....	white	medium
Crapemyrtle.....	white, pink, red	large
WINTER		
Witch-hazel.....	yellow	small

The Styrax might be classed with large shrubs. Koelreuteria should be especially mentioned for its marvelous yellow flower clusters. The growth is rather ungainly, and not at all treelike. Cedrela has little flower color, but the long drooping flower clusters are showy and graceful. The Franklin tree is an American classic, its flowers like Camellias. Crapemyrtle, a famous southern tree, can be grown as far north as Delaware and southern New Jersey, but is then merely a large shrub. The Yellow Dogwood or Cornel is a shrub.



These clusters of Mountain-ash fruit must be envisioned in orange red

ORNAMENTAL FRUITING TREES

The colored berries of certain trees lack something of the artistic qualities found in flowers, but in other respects they contribute more to the beauty of a landscape or lawn group. There is little or no fading of color as in flowers, with rather an inclination to enrich and they last much longer. Berries are useful in the house not only in vases but in other decorative ways.

The Holly is perhaps enjoyed to a greater extent than any other. But it is a rather slow process to have one's own bearing plants. There are separate flowers, male and female, and in buying plants one should make enquiries. A grafted tree is the safer, and in addition there should be a nearby tree with male flowers. Plant Holly where there is no lack of water. A deciduous Holly (Winterberry) is excellent.

The large flowering Dogwood has small clusters of scarlet berries, and a well laden plant will vie with the Holly for brilliant beauty.

Mountain-ash has clusters of ravishing orange red berries. It makes but a small tree. Buy a tree that has already borne fruit.

There is a multitude of Hawthorns. The better known are Washington Thorn, Scarlet Haw (*Crataegus mollis*), and English Hawthorn.

The large red fruit of *mollis*, borne in great profusion, is a wonderful sight.

A decided novelty in more northern localities is the Hardy Orange, *Citrus* or *Poncirus trifoliata*. Real oranges of small size, but borne abundantly. Hardy in Philadelphia.

There are many lovely fruiting members of the Crab Apple group. *Photinia villosa* is a small tree with red fruit. For a large tree, the Blackgum or Sourgum is attractive with its dark blue fruit. Get several trees to insure fruiting, as the flowers are male and female.

TREES FROM THE WILDS

As a rule, and especially when one is anxious for pretty sure results, it is far better to procure nursery grown plants than to attempt to collect from the wilds. There is an element of satisfaction, of course, in growing some few things that one has gathered himself. It carries pleasant associations of an outing, very frequently.

Trees taken from a woods, except certain woodsy things like Rhododendron, Laurel, Azaleas, and Hemlock, are usually without vigor and a suitable root system. Even if they survive the removal, they are likely to be a long time building up to a worthwhile specimen.

Young Cedar trees are very tempting, but they usually fail or barely exist. Large Cedars moved with a good ball of roots and earth, are more successful.

At least Nature should not be robbed by great inroads on the wild things. Woods should be enriched and maintained and not depleted.

TREES IMMUNE FROM PESTS

It may be unfair to the various trees to consider their susceptibility to insect attack. However, the question is frequently raised, and must be answered as fairly as possible. Certain pests are prevalent in some sections and not in others; and some trees are not attacked where there is plenty of other food preferred by this or that insect. This discussion is therefore casual, and only meant to lead to personal investigations that will bear more directly on one's own locality and tree collection.

In Japanese beetle zones Cherries, Sassafras and Elms suffer terribly. The beetle eats fruit—Apples, Plums and Peaches.

Caterpillars show fondness for Soft Maple, Poplar, Yellow Locust, Apple, and Arborvitae.

Aphis revel on leaves of Norway Maple, trunks of Sugar Maple, and branches of White and Scotch Pine.

Borers infest Ash, Yellow Locust, Lombardy Poplars, Maples and Oaks. The Ashes and Oaks with scale.

Ginkgo is one of the few trees that appears to have thus far avoided attacks from any insect or disease. The Oriental Plane, and Oaks with leaves of heavy texture, seldom meet with leaf attack.

LOW BRANCHING TREES

The great beauty in some trees lies in an effective low spread of branches. An English Beech trimmed up would be without character. The red foliage of the Japanese Maple would be chiefly out of range of vision without low branches. The European Linden's beauty lies in a fullness of outline made by moderately low spreading branches. Blackgum shows to beautiful advantage when its branches sweep the ground.

Other trees are distinctly treelike and one looks for an ascending leader with high and wide limbs. The Elm is such. Then there are trees which have such a low tendency, one must start them with fairly high trunks. These are Boxelder, Norway Maple, Honeylocust, Ash, *Koelreuteria*, *Sophora*, Weeping Willow and American Beech.

Trees with decidedly forking leaders are to be shunned. Sooner or later they are likely to split. Orchardists will not allow two side branches to grow from any one point. Fruit trees are better for harvesting when grown with branches low.

There is much to be learned about the branching habits of trees, with care in first selection, and then in later training.

HARDINESS OF TREES

There is not infrequent misunderstanding of the horticultural application of the term hardiness. It refers only to ability to stand the Winter successfully, and not to ordinary vigor or stamina.

No geographic limits can be accurately drawn to show how far north any one plant could be considered hardy, for there are frequently modifying influences to bear on results. Two plants of the same kind within a few yards of each other might winter differently. Generally speaking, however, limits may be defined, and it is for the individual to determine the more favorable situations within the borders fixed.

Many plants will succeed in proximity to large bodies of water, provided they are not windswept; inland, where the atmosphere is dry, they will not stand the Winter. This will apply as well to any locality that suffers from a Summer drought. The plants are insufficiently nourished and lack ability to stand the rigors of a Winter.

Plants that are known to be easily winterkilled must be given a right start. They should not be transplanted in Fall. The first Summer they must be fully supported with food and moisture, but *not in an extreme way*. If a plant is overstimulated, especially in the Fall when it should be ripening its growth, it will be tender. The trunks of trees are sometimes wrapped with burlap to keep the sun from evaporating the plant juices. A mulch of litter or peat may be put over the ground around the tree to help retain moisture.

A dry, hot atmosphere paves the way for disease in some plants. Summer suffering means Winter demise.

Using Philadelphia as an approximate northern limit, the following plants may be grown up to that point:

Crapemyrtle, Deodar Cedar, Franklin Tree, Sweetgum, *Magnolia grandiflora*, Nordmann Fir, Mimosa, English Holly, Lawson Cypress, Fig, Evergreen Privet.

Washington, D. C. is more favored and would include English Laurel, Italian Cedar, Longleaf Pine, and Water Oak.

The Bigtree of California, *Sequoia gigantea*, will grow in Philadelphia if helped through the Summer by spraying with Bordeaux Mixture.

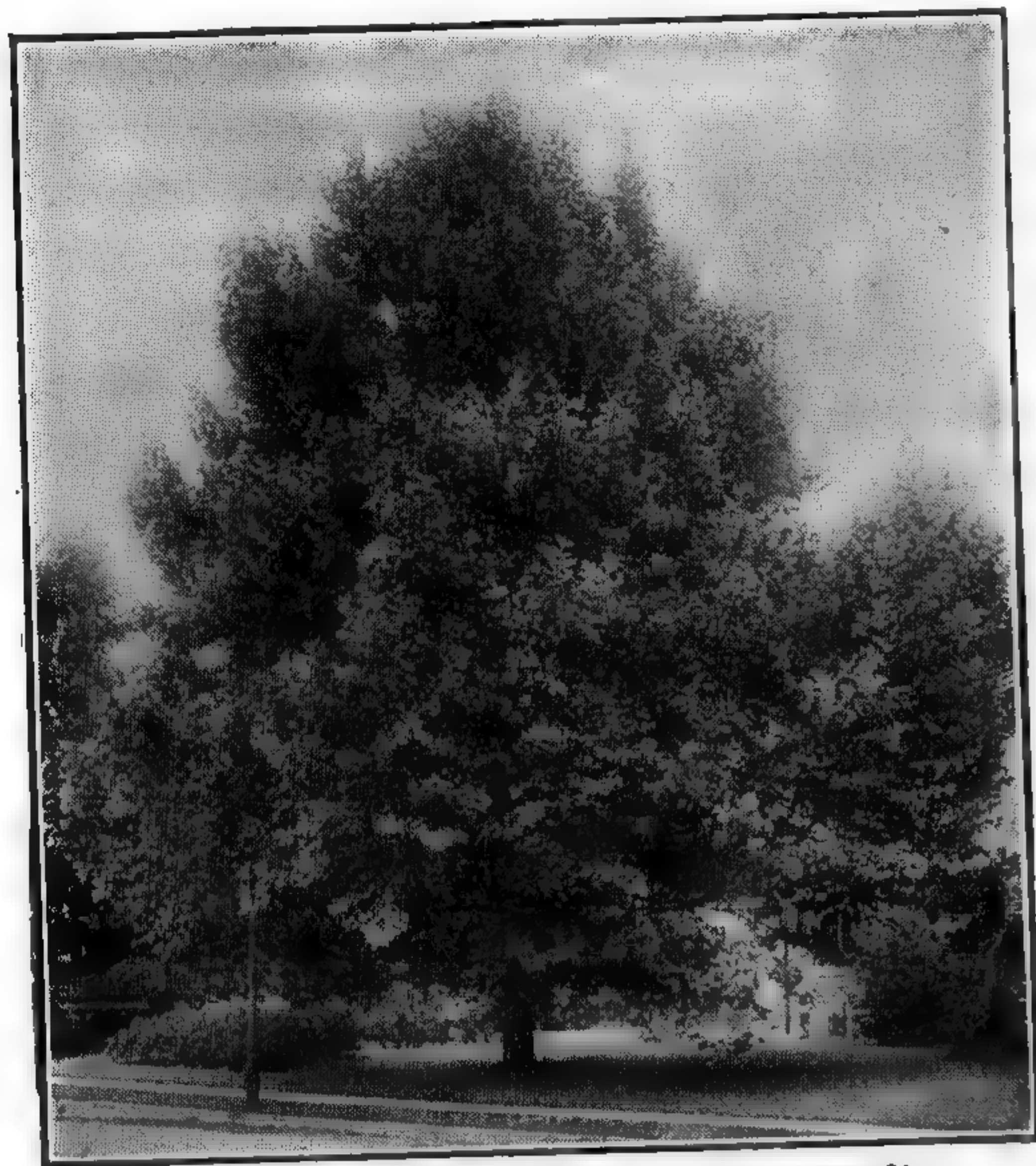
Some of the more northern plants, like Balsam-fir, White Pine and Hemlock should not be planted in hot and dry places farther south.

There is much interest to be had in learning the best locations for plants, and introducing those that others have not always succeeded in raising.

STREET AND AVENUE TREES

There is a principle to be adhered to rather rigidly in selecting trees for the street or avenue: do not mix different kinds in any one block or along a limited distance. If someone has previously planted along the row, and kinds are mixed, select the kind that seems to be doing the best, looks well, and is altogether appropriate, and plant that as your contribution to the avenue.

Some cities and villages are outstandingly attractive because some one kind of tree has been used throughout—Elms in New England



The Oriental Plane. *Platanus orientalis*
Much used in street planting and best employed where the houses stand 60 to 80 feet apart across the street

Oaks will always be prime favorites. Southerly, the Water Oak, and in northern states the Red and Pin Oaks are good choice. The Tulip Tree, small-leaved European Linden, White Ash and Oriental Plane are satisfactory. The latter is appreciated for ease of transplanting (in Spring especially) and rapid growth. In the Middle States the Hackberry is much used. In parts where the Summers are not too hot and dry, Sugar Maple is satisfactory. Ginkgo is valuable for narrow streets where green and growth are wanted, and quick shade is unimportant.

For open roadside planting and avenues on estates one would again turn to the Red, White or Scarlet Oaks, to Elm and Ash. Southward, there are the Pecan and Live Oak. On driveways we would select Norway and Schwedler Maples, and the English Linden.

EVERGREEN SHRUBS

There is a distinct cleavage of interest and usage between trees and shrubs. Trees create a skyline; they are relief to an otherwise flat

towns, for example—but generally speaking a variety of good things, block by block, is preferable. An excessive planting of Norway Maples, Oriental Planes, Poplars, etc., mars many an otherwise attractive town setting.

More so than in lawn planting, care must be exercised to select kinds for permanence, deep-rooting, and high - branching characteristics. Trees should be as free as possible from insect attacks and disease.

and monotonous lawn. Shrubs are distinctly a garden element, plastic to mould and develop graceful furnishings, to soften otherwise harsh lines, and where they flower to bring a color sprightliness into the landscape scene.

Evergreen shrubs are exceedingly useful. Many are shade loving, meeting a prevalent need. As a class, they remain dwarf and well foliaged. Grace is combined with Winter effectiveness; there are seldom ill effects from overcrowding.

This is a class of plants that mostly demands a light, rich soil that is well drained but not too dry. Peat and well rotted manure mixed with soil in equal parts, with no lime, will be generally suitable.

One of the most useful evergreen shrubs, hardy in Philadelphia, is Japanese Holly, preferably *Ilex crenata microphylla*. It may be grown as a single specimen 10 or 12 ft. high and full, or as a low, bushy specimen. May be planted rather close to the house if desired. A well grown specimen of American Holly is useful where a large evergreen plant is needed. It likes plenty of water.

Rhododendrons are the most popular evergreen bedding shrub. The bright colored hybrids are not so easily procured at moderate prices, and the native *maximum* is freely used. It is the best for free growth and foliage effects. The Catawba Rhododendron has deep rose colored flowers and neat foliage, but grows a little slower. *Carolinianum* is another American sort with sweet pink flowers, very early and free blooming; low growing. These three kinds may be grown together in borders and groups. Mountain-laurel, or *Kalmia*, may be effectively used with Rhododendrons if kept somewhat to themselves in the group. The narrow leaves and dense growth do not admit of mixture with others. *Leucothoe* makes an attractive planting in front of larger Rhododendrons. Its long lance leaves and free growth are too much to front Mountain-laurel and the small Rhododendrons. *Pieris floribunda*, and *Pieris japonica*, taller, are good for variety in the foreground of the same bed.

Among the newer things, though by now well tested, are a number of evergreen Barberries. They vary greatly in habit of growth, foliage, and spines, the latter being not the least of their attractions. An attempt to describe them in limited space is useless. Get a collection and try them out; or first try certain ones that are very popular, as *Berberis verruculosa*, *B. julianae*, *B. dielsiana*, or *B. stenophylla*.



Rhododendrons are the most popular evergreen bedding shrubs, and especially for partially shaded places. They are most effective when closely planted

An old shrub that has come back into deserved popularity after a period of obscurity is the Firethorn, *Pyracantha*. It is a strong, rather loose growing relative of the Hawthorn. The striking characteristic is clusters of orange red berries in Autumn. The variety *lalandi* has the brighter berries. Hardy in Philadelphia.

An evergreen Privet with laurel like leaves is an indispensable shrub. It grows easily in difficult positions. *Ligustrum lucidum* and *L. japonicum* are the hardier kinds.

The Cotoneasters are another group that may well be studied by means of a collection. Some are doubtfully hardy. The most popular is *Cotoneaster horizontalis*, a low, artistically spreading plant; good for rockeries and to border larger shrubs. It has bright red berries, and its small leaves are bright red in Autumn. Almost evergreen.

Dwarf Azaleas are among the most popular of plants. *Amoena*, a magenta sort, was largely used until *hinodegiri* came into the field. This lovely red flower with larger leaves and more compact growth is now preferred. Other kinds belonging to the same class are called Kurume varieties. These come in various shades of color, and they differ in degrees of hardiness.

Until recently it was not known that the Heavenly Bamboo was hardy at Philadelphia. This is *Nandina domestica*, a distinctive plant with straight, bamboolike stems, and feathery leaves. Height 3 to 8 ft. Very worth while.

Euonymus japonicus is one of the most widely used shrubs. Especially good along the seacoast, it will grow in rather poor, dry soil where others will not succeed. Can be trimmed and grown bushy or upright. Very subject to scale, though this is easy to keep under control if taken promptly. There are silver and gold striped varieties. Other evergreen *Euonymus* are *sieboldianus*, a splendid free growing species, and *vegetus*, a half-shrubby variety of climbing *radicans*.

Mahonia aquifolium and *M. bealei* are interesting subjects. Members of the Barberry family, the foliage is quite Hollylike. That of the first named is variably colorful, at times almost black; at others a beautiful bronze. *Bealei* foliage holds to deep green; grows taller and is rather stiff. Interesting in oddity.

DECIDUOUS FLOWERING SHRUBS

Flowering shrubs have many of the good qualities of garden flowers with less insistence on perpetual care. True, they require much

more room, but they play a larger part in the landscape scene. Few shrubs flower all Summer, but one may by careful selection have a sequence of bloom that is unbroken. Most of them may be used for cut flower purposes. Those that flower in very early Spring furnish added interest if flowering shoots are cut and placed in water indoors. If not forced in heat, but brought gradually into flower, they will be very charming for house use. For this there are Forsythia, Fragrant Bush-honeysuckle, *Cornus mas*, Spicebush, Flowering Almond, *Spiraea thunbergi*, *Cydonia japonica*, catkins of Hazel and Birch, Pussy Willow, Redbud or Judas-tree, and many others.

Most shrubs are grouped together in masses or borders. These may be in circular plots, straight front beds along walks and margins, or with suitable waving outlines. If the latter be boldly done, and not merely in little, meaningless wavelets, the effect may be very striking.

A common mistake is in setting shrubs too close together. Almost any plant can stand 4 ft. from another, and preferably 6 ft. It is thus one gets perfection in outline for the individual, maintains better health among the plants, and secures a more pleasing effect, for crowding plants are usually noticeably misshapen. Dwarf shrubs may be set 2½ to 4 ft. apart.

It is wise to try to picture the mature plant when arranging a mixed group. For example, the following are quite erect and should occupy central or rear positions: Deutzia, Althaea, Lilac, Tamarix, *Euonymus europaeus*, *Spiraea prunifolia*, and Laburnum.

These are large and full spreading: Forsythia, Bush-honeysuckle, Purple Hazel, *Spiraea vanhouttei*, Mockorange, Opulaster, Hardy Hydrangea, and Viburnums.

Some dwarf shrubs are *Spiraea* Anthony Waterer, *Deutzia gracilis*, Dwarf Mockorange, *Hypericum aureum*, Japanese Barberry, Red and White Snowberries, *Forsythia suspensa*, and *Stephanandra*.

The proper pruning of shrubs is a great essential. Some are mispruned, but most are entirely neglected. The nature of flowering shrubs is not far removed from that of an herbaceous perennial in this respect: stems or branches that have flowered this year are not of great value for next year. In the herbaceous plant, the stems die in Autumn. Stems of the shrub do not die off, but, on the other hand, they are mostly of no use for flowering a second time; new shoots take on this duty. Consequently, most old flowered growths can be pruned away from year to year, encouraging new flowering wood. There are

some exceptions to this. Firebush (*Chaenomeles*), Redbud and Judas-tree and some Viburnums should be pretty much let alone. The individual characteristics of shrubs must be studied, but there is nothing about it very difficult to learn. Pruning should be done at least every two years; just a little each year is preferable.

One of the more interesting things is to develop a succession of bloom by planting a variety of shrubs. To enable the reader to work out such a planting, the following table is presented. As far as possible, without recourse to records, and simply from personal association, these lists are compiled in the approximate order in which they might be expected to flower. The arrangement is not infallible. Many will be blooming at the same time. Warm or cool locations may advance or retard flowering. Geographical influences shorten the whole flowering season and Spring and Summer flowers meet.

EARLY SPRING

Spring Witch-hazel (<i>Hamamelis vernalis</i>). Yellow	Thunberg Spirea (<i>Spiraea thunbergi</i>). White
Winter Bush-honeysuckle (<i>Lonicera fragrantissima</i>). White	Garland Spirea (<i>Spiraea arguta</i>). White
Firebush or Flowering Quince (<i>Cydonia</i>). Red, white	Dogwood (<i>Cornus</i>). White, pink
Forsythia. Yellow	Apple (<i>Malus</i>). White, pink
Shadbush (<i>Amelanchier</i>). White	Pearlbush (<i>Exochorda</i>). White
Magnolia stellata. White	Tamarix parviflora. Pink
Magnolia conspicua. White	Persian Lilac (<i>Syringa persica</i>). Pink
Magnolia soulangeana. Pink	Cherry (<i>Prunus</i>). White, pink
Magnolia liliflora. Purple	Common Lilac (<i>Syringa vulgaris</i>). Blue, lavender
Judas-tree (<i>Cercis siliquastrum</i>). Pink	Common Snowball (<i>Viburnum opulus sterile</i>). White
Redbud (<i>Cercis canadensis</i>). Pink	Sweetshrub (<i>Calycanthus floridus</i>). Brown
Flowering Almond (<i>Prunus glandulosa</i>). Pink, white	Plum (<i>Prunus</i>). White
Spicebush (<i>Benzoin aestivalis</i>). Yellow	Barberry (<i>Berberis</i>). Yellow
Cornelian-cherry (<i>Cornus mas</i>). Yellow	Chokeberry (<i>Aronia</i>). White
Peach (<i>Amygdalus</i>). Red, pink, white	Vanhoutte Spirea (<i>Spiraea vanhouttei</i>). White
Silverbell (<i>Halesia</i>). White	Hugo Rose (<i>Rosa hugonis</i>). Yellow

LATE SPRING

Bush-honeysuckles. Pink, white	Late or Himalayan Lilac (<i>Syringa villosa</i>). Pink
White Kerria or Jetbead (<i>Rhodotypos kerrioides</i>). White	Weigela. Red, pink, white
Garlandflower (<i>Daphne</i>). Pink	Deutzia. White, pink
Yellow Kerria (<i>Kerria japonica</i>). Yellow	Siberian Pea-shrub (<i>Caragana</i>). Yellow
Magnolia lennei. Red	Hawthorn. White, pink, red
Snowbell (<i>Styrax</i>). White	Japanese Snowball (<i>Viburnum tomentosum</i> and <i>plicatum</i>). White
Araleas. Yellow, pink, white, red	Rugosa Rose (<i>Rosa rugosa</i>). White, red
Sweet Syringa or Mockorange (<i>Philadelphus</i>). White	

LATE SPRING—*Continued*

Scotch Broom (<i>Cytisus scoparius</i>). Yellow	Bastard Indigo (<i>Amorpha fruticosa</i>). Purple
Goldenchain (<i>Laburnum</i>). Yellow	French Tamarix (<i>T. gallica</i>). Pink
Fragrant Viburnum (<i>Viburnum carlesi</i>). White	St. Johnswort (<i>Hypericum</i>). Yellow
	Spiraea Anthony Waterer. Pink

SUMMER

Beautybush (<i>Kolkwitzia</i>). Pink	Sweet Pepperbush (<i>Clethra</i>). White
Beautyberry (<i>Callicarpa</i>). Pink	Caspian Tamarix (<i>Tamarix odessana</i>). Pink
Euonymus patens. White	Tree Lilac. White
Buttonbush (<i>Cephalanthus</i>). White	

LATE SUMMER

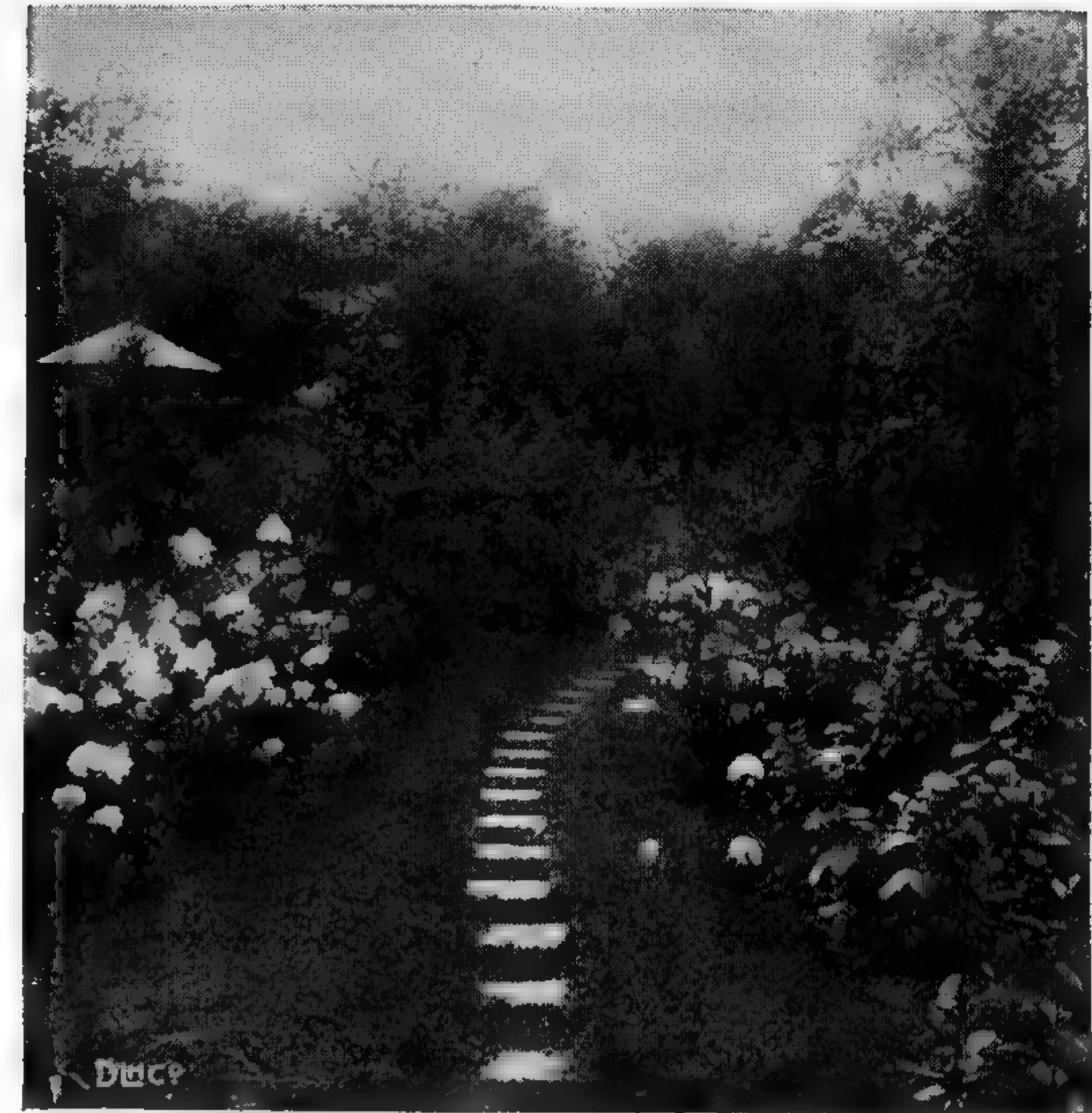
Leadplant (<i>Amorpha canescens</i>). Lavender	Butterflybush (<i>Buddleia</i>). Pink
Althaea. Red, pink, white	Mintshrub (<i>Elscholtzia</i>). Purple
Aralia. White	Blue Spirea (<i>Caryopteris incana</i>). Blue
Hydrangea. White	Bushclover (<i>Lespedeza</i> or <i>Desmodium</i>). Purple, white
Five-stamen Tamarix (<i>Tamarix pentandra</i>). Pink	

WINTER

Virginia Witch-hazel (*Hamamelis virginiana*). Yellow



Spiraea vanhouttei is considered the prettiest, most graceful of all shrubs



Grouping of shrubs along the garden pathway

MASSING SHRUBS

In an endeavor to get as much variety as possible, and a succession of flowers, one may err in not having enough of any one thing to make a decided impression. An occasional bold stroke of the landscape brush will lift up an otherwise commonplace planting. The Forsythia is one of the most popular shrubs for mass planting. Although one may see it on every other property, it is a plant that one does not tire of. Another fascinating plant, and less common, is the Tamarix. Unless kept under control by almost annual severe pruning, it becomes straggling, lean and unattractive. Grown *en masse*, and the foliage kept low, it is charming. The Spring flowering one should be pruned after flowering; the Summer one prune in Spring.

Spiraea vanhouttei can be grown in quantities, especially as a medium high border. Its graceful sprays of white flowers can hardly be surpassed, and the Summer foliage is pretty throughout.

Hydrangeas are better in numbers than singly if annually pruned to promote fine heads of flowers.

Other good massing shrubs are deciduous Azaleas, Japanese Barberry, *Rosa hugonis*, *Rosa rugosa*, White Kerria (*Rhodotypos*), Snowberry, Scotch Broom and St. Johnswort.

ORNAMENTAL BERRY SHRUBS

Some of the shrubs with bright berries are perfectly bewitching. We often tire of Japanese Barberry—it is used so much—but in Winter when its long branches are hung with the brightest of red berries, one must wax enthusiastic over it. Sprinkled with snow in climates so favored, there is an added charm. And speaking of snow, there are the Snowberries, red and white. White Snowberry (*Symphoricarpos racemosus*) is the more reliable. It virtually blooms all Summer, and so there is a succession of the waxy-white berries. At a little distance, the berries will be taken for flowers. There are times when the Red Snowberry or Coralberry (*Symphoricarpos vulgaris*) is remarkably brilliant with blood-red berries. But if the soil is not good or too dry, results are likely to be disappointing. *S. chenaulti* is new and good.

Among larger growing shrubs, the Bush-honeysuckles are supreme. A bush 6 ft. or more high and spreading 8 to 10 ft., sprinkled all over with translucent red berries with a setting of green foliage, is a pleasing sight. Then there are varieties with amber-colored berries that are attractive. Some good Honeysuckles are *Lonicera ruprechtiana*, *L. maacki*, *L. tatarica*, *L. morrowi*.

Perhaps the most unusual color in berries is that of the Beautyberry, *Callicarpa*. They are purple. It is a small shrub. *Callicarpa purpurea* is barely hardy in Philadelphia. The berries are crowded in lines along the stems. *C. japonica* is hardier, the leaves are larger, and the berries, though not so abundant, are very pretty.

Red Chokeberry, *Aronia arbutifolia*, with rather large red berries, is a splendid berry shrub for partly shaded places. There is also a variety with black fruit.

The American Cranberry bush, *Viburnum americanum*, has bunches of blood red berries that are quite startling as they seem to splash the landscape.

Spicebush (*Benzoin*) grows in shade, rather large, with an abundance of bright red berries. It is a good under-shrub for Dogwoods, which are similarly bright in fruit.

Winterberry (*Ilex verticillata*) is a deciduous Holly. The branches are densely spiked with berries that are frequently used to make up deficiencies in the usual Christmas Holly supply.

Other good plants for berries are *Viburnum tomentosum*, *Rosa rugosa*, *Euonymus europaeus*, *Euonymus alatus*, *Cornus alternifolia*, *Viburnum wrighti* and *Viburnum dentatum*.

HEDGES

A hedge is not a thing to be decided on and planted hurriedly. Often it should be omitted; again, it is just the thing needed to properly organize the parts of grounds. But the question is, what kind of hedge (formal or informal, low or high—deciduous or evergreen) is most appropriate for a given position?

Most lawns, whether in their entirety or in sections, should be framed in some way; it helps to identify or localize a specific scene. But sometimes this is accomplished by other means. A fence may be better under some circumstances; or, instead of a continuous row or formal hedge, the lawn area may be framed by broken groups or borders of shrubbery, straight on the border side, and sinuous on the inner or lawn side. In gardens a straight line bed of plants may serve as a boundary and be more delightful than a simple hedge; or this same bed of plants may even be bordered with a very low, dwarf hedge as a finishing touch.

A formal hedge, perhaps just a very short piece, may work wonders in dividing the front areas from the rear around a house, or perhaps to cut off a drying yard, a garden or garage. Heavy hedges are seldom appropriate along a path leading to a front door but a diminutive thin line of hedgelike box may line the walk.

When a hedge is first planted, it is probably smaller or lower than it is intended to be when fully established. It is therefore important in selecting the kind of hedge to put out of mind the young nursery size plants and think of the finished hedge. What height and what form will best fit into the picture? A foot higher than it should be may make a clumsy picture. A close-cropped hedge may be in keeping rather than a hedge with soft, feathery growth.

No plant is more universally used for hedges than Privet. In more northern climates (but not too cold) it is California Privet; southward it is the Amur Privet, which is evergreen there. For quite cold places, Itoya Privet is used. Golden Privet is occasionally used, but such forms with their bizarre colors are seldom satisfactory.

Japanese Barberry is next in popularity, but it is so different in character as to have its own place. Barberry is low and somewhat spreading. Although it may be trimmed closely, it is seldom pruned more than once a year, being allowed to grow naturally and gracefully. As a side boundary hedge, or along a fence, it is usually at its best.

The Box Barberry is a very dwarf, small-leaved form used as a small edging.

In exceptionally cold climates, very hardy plants must be used. There are Buckthorn and Hawthorn (English, Cockspur or Washington); also evergreens, such as Juniper, Hemlock or Norway Spruce. Even White Pine has been used in large hedges. From England we occasionally copy Beech hedges.

Along the seacoast *Euonymus japonicus* does especially well as an evergreen shrub hedge. Tamarix has been used, but needs watching and careful pruning.

Bold hedge effects can be made along private roads by rows of Privet allowed to grow tall, trimming only the sides occasionally. The Lombardy Poplar may be used similarly.

Many flowering shrubs may be used for hedging, but not to be formally trimmed. *Spiraea vanhouttei* is most lovely. Peegee Hydrangea is striking. *Cydonia japonica* and *Rosa rugosa* are good. The latter is also a good seashore hedge.

Hedges are sometimes set in double rows to insure breadth at the base. But one can get too much width in proportion to height, and the individual situation must be studied carefully before deciding this and the distance apart in the row itself.

AN OUTDOOR LIVING ROOM

Much is being said and written to promote the idea of outdoor living rooms. All outdoors invites and welcomes mankind to live as much as possible in the open, but as much as we may appreciate the wide fields, the meadows, and the woods, there is always a special contentment to be found in the privacy of one's own plot of ground. And the "living room" is simply an open area at home so designed and planted and fitted out as to foster a happy home life in the out-of-doors.

There is no limit to which one may go in developing this idea while exercising his own particular tastes and hobbies. The artist will find the greatest enjoyment and opportunities in creating landscape effects boldly or in delicate touches; playing with lights and shadows; painting with floral or bright berry colors; penciling with foliage differences, and garden outlines. The mechanically inclined within the borders of his room may work over rock gardens, including little rivulets, water-

falls and pools; there are seats, trellises, and bird houses to be made and placed. Even the bookworm might make his outdoor room part of his special interests by plantings and groups of plants having certain human associations; or the physical arrangements may be such as to suggest seclusion, peace and quiet, and a comfortable place for reading. The social creature naturally has the greatest breadth of opportunity. To entertain out of doors is the ambition of every hostess. Then this living room may perhaps become a series of rooms—detached gardens and lawns—where guests may stroll from one to another finding in each a different treatment and mood.

If we have developed this idea into proportions that discourage the small land owner, let it be remembered that people of greatest understanding have ever made it certain that home and happiness do not depend so much on great possessions as on the spirit and will to make the most of what one has. A tiny yard may be made the home's brightest spot.



These Fir trees, though small, will one day be the owner's pride—handsome, rich features of well kept grounds

BLOOMING DATES OF TREES, SHRUBS AND CLIMBERS

T—Tree

S—Shrub

C—Climber

*Indicates that blooming period is likely to extend beyond the date under which it is classed.
(Revised from a list by Samuel N. Baxter and compiled for the latitude of Philadelphia.
North and south of that city the blooming dates will be respectively later and earlier.)

April 1 to 15

Botanical Name	Common Name	Group	Height (ft.)	Color of Flowers
*Daphne mezereum album.....	White February Daphne	S	3	White
Lonicera fragrantissima.....	Winter Honeysuckle.....	S	6	White
Cornus mas.....	Cornelian-cherry.....	S	10-12	Yellow
*Magnolia stellata.....	Star Magnolia.....	S	5-8	White
*Forsythia suspensa.....	Weeping Golden Bell.....	S	8	Yellow
*Acer rubrum.....	Red Maple.....	T	75-100	Red
*Acer platanoides.....	Norway Maple.....	T	100	Yellow
*Benzoin aestivale.....	Spicebush.....	S	10-15	Yellow
Spiraea thunbergi.....	Thunberg Spirea.....	S	5	White

April 16 to 30

Magnolia conspicua.....	Yulan.....	T	50	White
Magnolia soulangeana.....	Saucer Magnolia.....	T	15	Pink
Magnolia kobus.....	Kobus Magnolia.....	T	80	White
Cerasus avium alba and rosea plena.....	Double-flowering Cherry.....	T	25	White, pink
Cerasus sieboldi rubra plena.....	Double-flowering Cherry.....	T	15-25	Red
*Cercis chinensis.....	Chinese Redbud.....	S	15-50	Pink
*Cercis canadensis.....	American Redbud.....	S	20	Pink
*Pieris japonica.....	Japanese Andromeda.....	S	10-30	White
*Leucothoe catesbaei.....	Drooping Leucothoe.....	S	6	White
*Cydonia japonica.....	Flowering Quince.....	S	3-4	White, red
*Spiraea prunifolia.....	Bridalwreath.....	S	6	White
*Citrus trifoliata.....	Hardy Orange.....	S	15-20	White
*Prunus (Amygdalus) persica.....	Flowering Peach.....	T	10-25	White, red, pink
*Prunus (Amygdalus) nana.....	Russian Almond.....	S	5	White, pink
*Sassafras variifolium.....	Sassafras.....	T	30-60	Yellow
*Amelanchier canadensis.....	Downy Shadblow.....	S	25	White
*Exochorda grandiflora.....	Pearlbush.....	S	6-8	White
Ostrya virginiana.....	American Hophornbeam.....	T	30	Blue
*Syringa oblata.....	Broadleaf Lilac.....	S	12	Yellow, red
*Ribes aureum and sanguineum.....	Flowering Currant.....	S	4-5	White
*Prunus pissardi.....	Purpleleaf Plum.....	S	15-25	White
Corylopsis pauciflora.....	Buttercup Winterhazels.....	S	2-3	Yellow
*Rhus aromatica.....	Fragrant Sumac.....	S	3-8	Yellow

May 1 to 15

*Staphylea colchica.....	Colchis Bladdernut.....	S	12	White
*Rhodotypos kerrioides.....	Jetbead.....	S	6	White
*Kerria japonica.....	Kerria.....	S	5-10	Yellow
*Cornus florida and rubra.....	Flowering Dogwood.....	T	20	White, pink
Wisteria sinensis and alba.....	Chinese Wisteria.....	C	20	White, blue
Pyrus (Malus) parkmani (Halliana).....	Flowering Crab.....	T	20	Pink
Pyrus (Malus) coronaria, ioensis.....	Flowering Crab.....	T	20	Pink
Pyrus (Malus) floribunda atropurpurea and schiedeckeri.....	Flowering Crab.....	T	10-15	Red
Magnolia lennei and meehani.....	Purple Magnolias.....	T	10-15	Purple
Magnolia fraseri.....	Fraser Magnolia.....	T	40	White
Magnolia gracilis and purpurea.....	Bush Magnolias.....	S	10	Purple
*Aesculus hippocastanum.....	White Horsechestnut.....	T	60-80	White
*Aesculus rubicunda.....	Red Horsechestnut.....	T	20-40	Red
*Xanthoceras sorbifolia.....	Chinese Flowering Chestnut.....	S	15	White
Azalea amoena.....	Amoena Azalea.....	S	1-8	Pink

BLOOMING DATES OF TREES, SHRUBS AND CLIMBERS 141

May 1 to 15—Continued

Botanical Name	Common Name	Group	Height (ft.)	Color of Flowers
Azaleas pontica and mollis.....	Pontic and Chinese Azaleas.....	S	3-5	White, yellow
Azalea nudiflora.....	Pinxterbloom.....	S	5-8	Pink
Azalea vaseyi.....	Pink Shell Azalea.....	S	5-8	Pink
Rhodora canadensis.....	Rhodora.....	S	2	Pink
*Elaeagnus longipes and umbellatus.....	Cherry and Autumn Elaeagnus.....	S	6-12	White
*Prunus padus, pennsylvanica and pumila.....	Bird and Dwarf Cherries.....	T	10-15	White
Crataegus coccinea.....	Thicket Thorn.....	S	15	White
Caragana arborescens and pendula.....	Pea-shrub.....	S	6-8	Yellow
Halesia tetraptera.....	Great Silver-bell.....	S	20	White
*Berberis vulgaris, purpurea and thunbergi.....	European Purple and Japanese Barberry.....	S	4-6	Yellow
Asimina triloba.....	Pawpaw.....	T	10-40	Brown
Akebia quinata.....	Akebia.....	C	12	Purple
*Lonicera grandiflora rosea and morrowi.....	Bush Honeysuckle.....	S	6	White, pink
Mahonia aquifolium.....	Oregon Hollygrape.....	S	2-4	Pink
*Paulownia tomentosa.....	Royal Paulownia.....	T	40	Purple
Aesculus pavia.....	Red Buckeye.....	T	5-7	Red
*Viburnum opulus sterilis.....	Common Snowball.....	S	8	White
*Viburnum tomentosum.....	Doublefile Viburnum.....	S	6-8	White
*Viburnum sieboldi.....	Siebold Viburnum.....	S	6	White
*Viburnum lantana.....	Wayfaring-tree.....	S	10-15	White
*Robinia hispida rosea.....	Rose-acacia.....	S	4-5	Pink
*Weigela rosea and candida.....	Diervillas.....	S	4-5	White, pink
*Deutzia lemoinei and gracilis.....	Lemoine and Slender Deutzia.....	S	3-5	White
Daphne genkwa and cneorum.....	Daphne.....	S	1	Pink
*Calycanthus floridus.....	Sweetshrub.....	S	3-5	Reddish brown
*Norhus aucuparia.....	European Mountain-ash.....	T	30-40	White
*Fraxinus ornus.....	Flowering Ash.....	T	25	White
*Cytisus scoparius.....	Scotch Broom.....	S	3	Yellow
*Myrica vulgaris and alba.....	Common Lilac.....	S	12-15	White
*Myrica rothomagensis (chinensis).....	Chinese Lilac.....	S	10-12	Blue
*Myrica, French named varieties.....	Improved Single and Double Lilac.....	S	10-12	White, pink, etc.
Nambucus pubens.....	Scarlet Elder.....	S	6-8	White
*Tamarix africana.....	African Tamarix.....	S	15	Pink
*Spiraea vanhouttei.....	Van Houtte Spirea.....	S	5-6	White
Zanthorhiza apiifolia.....	Yellowroot.....	S	10-20	Brown

May 16 to 30

Azalea calendulacea.....	Flame Azalea.....	S	4-10	Red
Mufphyalea trifolia and bumalda.....	American and Bumalda Bladdernut.....	S	6-8	White
*Clematis Named Hybrids.....	Large-flowering Clematis.....	C	80	White, pk., blue
*Robinia pseudoacacia.....	Common Locust.....	C	80	White
*Crataegus oxyacantha and Paul Scarlet.....	English Hawthorns.....	S	15-20	Red, white, pk.
*Chionanthus virginica.....	White Fringetree.....	S	20-30	White
Neviusia alabamensis.....	Snow-wreath.....	S	3-6	White
*Laburnum vulgare.....	Goldenchain.....	T	20	Yellow
*Rosa rugosa and alba.....	Japanese Roses.....	S	3-5	White, pink
*Rhododendron hybrids.....	Named Hybrids.....	S	6-12	White, pk., red
*Viburnum plicatum.....	Japanese Snowball.....	S	6-8	White
*Myrica persica and alba.....	Persian Lilacs.....	S	5-10	White, blue
Myrica emodi (villosa) himalayan.....	Lilac.....	S	8	Pink
Myrica pubescens.....	Hairy Lilac.....	S	6	White
Prunus serotina.....	Black Cherry.....	T	80	White
Spiraea reevesiana.....	Reeves Spirea.....	S	4	White
Cornus alba.....	Tatarian Dogwood.....	S	8-10	White

May 16 to 30—Continued

Botanical Name	Common Name	Group	Height (ft.)	Color of Flowers
*Viburnum opulus	European Cranberry	S	12	White
*Viburnum prunifolium	Blackhaw	S	15	White
Photinia villosa	Photinia	S	15	White
*Liriodendron tulipifera	Tuliptree	T	150-190	Yellow
Magnolia tripetala	Umbrella Magnolia	T	40	White
*Weigela Eva Rathke	Crimson Diervilla	S	5-6	Blue
Wisteria multijuga and alba	Japan Wisterias	C		White, purple
*Styrax obassia	Fragrant Snowbell	T	30	White
*Stephanandra flexuosa	Cutleaf Stephanandra	S	5	White
*Philadelphus coronarius	Sweet Mockorange	S	8-10	White
*Philadelphus lemoinei	Lemoine Mockorange	S	3-6	White

June 1 to 15

*Bignonia capreolata	Crossvine	C	50	Yellow
*Hydrangea petiolaris	Climbing Hydrangea	C	80	White
*Lonicera halliana	Hall Japanese Honey-suckle	C	15	White, yellow
*Lonicera sempervirens	Trumpet Honeysuckle	C	30	Red
Robinia viscosa	Clammy Locust	T	30-40	White
Gleditsia triacanthos	Honeylocust	T	70-140	White
Andromeda (Pieris) mariana	Staggerbush	S		White
Halesia diptera	Two-wing Silverbell	S	30	White
Cladrastis lutea	Yellow-wood	T	30-40	White
Crataegus crusgalli	Cockspur Thorn	S	15-20	White
Kalmia latifolia and angustifolia	Lambkill and Mountain-laurel	S	5-8	Pink
Syringa pekinensis	Peking Lilac	S	15	White
Syringa josikaea	Hungarian Lilac	S	12	Purple
Magnolia acuminata	Cucumber-tree	T	90	White
Magnolia macrophylla	Bigleaf Magnolia	T	50	White
Magnolia glauca	Sweetbay	T	10-12	White
*Deutzia crenata and Pride of Rochester	Tall Deutzia	S	6	White, pink
*Ligustrum ibota regelianum and vulgare	Regel and European Privet	S	8-10	White
Viburnum dentatum	Arrowwood	S	15	White
Viburnum acerifolium	Mapleleaf Viburnum	S	6	White
Styrax japonica	Japanese Snowbell	S	30	White
Stewartia japonica	Stewartia	S	50	White
Pterostyrax hispida	Fragrant Epaulette-tree	T	25	White
*Sambucus racemosa and laciniata	Elderberry	S	10	White
Rosa multiflora and rubiginosa	Japanese and Sweetbriar Rose	S	10-12	Pink
Colutea arborescens	Bladder-senna	S	10-15	Pink
*Cornus paniculata and sericea	Gray and Silky Dogwood	S	5-8	White
Wisteria frutescens	American Wisteria	C	30-40	Blue
Wisteria magnifica	Yelloweye Wisteria	C	30-40	Blue
Physocarpus opulifolius	Ninebark	S	9-10	White
*Spiraea billiardi	Billiard Spirea	S	5-6	Pink
*Amorpha fruticosa and canescens	Indigobush and Leadplant	S	4-15	Blue
*Ceanothus americanus	Jersey-tea	S	2-3	White
Gymnocladus dioica	Kentucky Coffeetree	T	100	White

June 16 to 30

*Hydrangea quercifolia	Oakleaf Hydrangea	S	6	White
*Hydrangea arborescens grandiflora alba	Hydrangea	S	2-5	White
*Sorbaria sorbifolia	Ural False-spirea	S	4	White
*Rosa lucida and setigera	Virginia and Prairie Roses	S	4-6	Pink
*Rhododendron maximum	Rosebay Rhododendron	S	10-35	Pink
*Spiraea bumalda and A. Waterer	Spirea	S	2	Pink
*Tilia americana	American Linden	T	80	White
Catalpa speciosa	Western Catalpa	T	100	White
Catalpa bignonioides	Common Catalpa	T	20-50	White

June 16 to 30—Continued

Botanical Name	Common Name	Group	Height (ft.)	Color of Flowers
*Rhus cotinus	Common Smoketree	S	10-20	Purple
*Rubus odoratus	Flowering Raspberry	S	3-6	Pink
*Hydrangea paniculata (Early flowering)	Panicle Hydrangea	S	20	White
*Hydrangea radiata	Silverleaf Hydrangea	S	6	White
*Hydrangea arborescens	Smooth Hydrangea	S	4-10	White
*Hydrangea opuloides	House Hydrangea	S	8	Pink, blue
*Hydrangea japonica caerulea	Japanese Hydrangea	S	8	Pink, blue
*Yucca filamentosa	Common Yucca	S	5	White
Azalea arborescens	Sweet Azalea	S	8-20	White
Azalea viscosa	Swamp Azalea	S	4-8	White



A clump of White Lilac

Chapter XI

HARDY PERENNIALS FOR THE PERMANENT GARDEN

By ALFRED CARL HOTTES

Combinations of Perennials—Considerations for a Perennial Border—Situation of Border—Preparation of Soil—Planting—Spring Planting—Autumn Planting—Cultivation—Watering—Staking—Removal of Old Flowers and Seed Pods—Necessity for Replanting—List of Indispensable Hardy Perennials—General Selection of Hardy Perennials—Medium Tall Perennials—Dwarf Perennials—Plans for Perennial Borders

BY hardy plants we mean those perennial herbaceous plants which will live a number of years and will stand the cold in the Northern regions. We use the word "herbaceous" to contrast them with shrubs and trees, for it means that they die down to the soil each year. Their growth is soft, not woody.

It may be asked why we talk so much about the proper care of this or that perennial, when on the whole the commonest ones merely need a medium good soil and their competitors, the weeds, removed. The reply is that we should not be content with Peonies, Phlox, or Iris unless they are grown to perfection, or unless we have the finest varieties.

We are interested in a particular flower often because it seems to possess a certain shape, color, or thrifty habit, which we admire. Our interest broadens when we prefer to get a great many varieties of the same flower. Finally, we are even interested in its botanical relatives. It is then that we become "cranks" and thoroughly know and truly enjoy a chosen favorite.

Perennials are adapted to such a range of soils and climates that we can surely find something beautiful to suit our situation exactly. If our land is very rocky and shallow, we must govern our selection of perennials accordingly, and we can follow nature quite closely in choosing the sort of plants to use.

Each garden should be our own, and should express our likes in color and combination, but we must be governed by good taste, with the possession of which some are born, while by others it must be acquired. The observations of others often make us able to choose wisely for ourselves.

COMBINATIONS OF PERENNIALS

A planting of delicate pink Hollyhocks, in front of which we place a good clump of white Phlox, is to be much commended. Similarly, the Phlox will combine nicely with Delphinium.

A bed of Peonies, in which have been planted some *Lilium speciosum rubrum* and *album*, is good; the Peonies will have finished flowering before the Lilies begin.

Huge beds of Bearded Iris of one variety are shown by themselves, but since they are out of bloom before July 1st, it is well to have something to maintain the beauty. A few attractive shrubs are then useful. Especially decorative are the Viburnums and the Honeysuckles which produce ornamental berries.

Coreopsis lanceolata and a deep violet blue Delphinium make an excellent contrast.

Another yellow and blue combination is Speedwell (*Veronica spicata*) with Evening-primrose (*Oenothera missouriensis*). The slender spikes of the Speedwell contrast nicely with the large, brilliant yellow flowers of the Evening-primrose.

Probably no flower of the Autumn is so graceful and welcome as the lovely Japanese Anemone. Excellent white and pink varieties are available. As they make no effect till mid-September they are best com-



long borders of hardy flowers growing freely and in great luxuriance

The arch in the garden wall focuses the view. The straight trim edges, yet there is abundant room to walk. These borders run right up to the dwelling house



A mixed border of hardy flowers

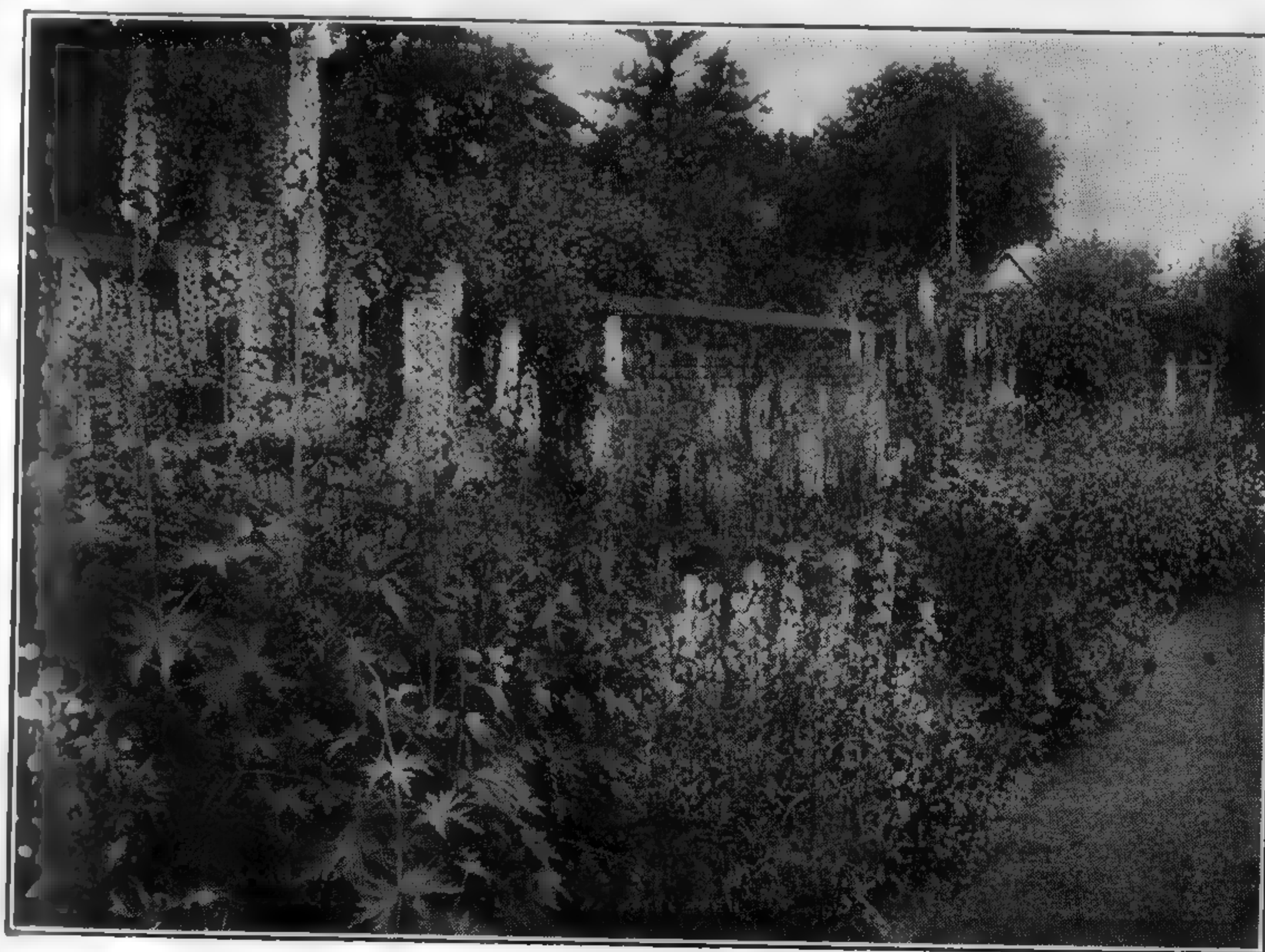
bined with a tall, ornamental grass which will give a good background.

The large group of perennial Asters or Michaelmas Daisies should not be forgotten; they are the charm of the real late Fall garden. Planted at the rear of borders, they make an excellent foliage background for the earlier flowering plants. Especially noteworthy is the *Aster ptarmicoides*, a very erect, strong-growing white species which blooms a trifle earlier than some of the others. A truly beautiful light blue is the Glory of Colwall, and a good pink is *A. novibelgi* St. Egwin. A very late species, 5 to 6 ft. tall, is *A. tataricus*, it possesses excellent clean foliage and bluish-violet flowers.

The Larkspurs and Monkhoods (*Aconitum*) are planted to advantage in conjunction with Madonna Lilies (*Lilium candidum*). Spring bulbs are often combined with a few *Adonis amurensis*, a very pretty little yellow flowering plant with finely cut leaves.

Under trees where grass will not grow, plant some *Ajuga reptans*. *Vinca minor*, called variously Myrtle and Periwinkle, is very useful, as it spreads rapidly, is evergreen and bears pretty blue flowers.

In every home yard there is a certain small area, between perhaps the walk and the wall, which it would be advantageous to have filled



A magnificent display of Delphiniums which should be the envy of all

nicely with plants; such an area is nicely planted to Goutweed (*Aegopodium*). This plant has green and white variegated leaves and thrives in any soil. It is rapid growing, but only attains a height of twelve inches.



Does not this charming border planting make you feel like having one of your own?

Excellent contrast combinations can be had by the intense blue *Anchusa italica* and the Yellow Marguerite (*Anthemis tinctoria*), placing the *Anchusa* at the back.

Another good combination is that of Bearded Iris, among which is planted the Summer-hyacinth (*Hyacinthus*, or *Galtonia candicans*), with its long spikes of white bells and its broad leaves. The bulbs of the Summer-hyacinth are placed in the soil in the Spring; when they bloom the Iris

will have finished its blooming but will furnish a foliage base. An effective use of the *Aquilegia caerulea*, or Rocky Mountain Columbine, is to place a number of these plants at the base of a yellow Rose; for example Harison's Yellow, or Persian Yellow.

Always consult Index to Contents. Familiarize yourself with it. There are hundreds of good things in this book that will escape your attention if you do not use the Index freely.

CONSIDERATIONS FOR A PERENNIAL BORDER

We have a great many classes of perennials, some of which are so



Bringing the flower garden up to the house
Note also the brick path and other architectural features

wild and aggressive that they should only be planted among the shrubbery. We have others which are very dainty and tender and whose growth must be carefully watched and their special needs for protection attended to.

We must scatter plants through the length of the border which will bloom throughout the season. We should, furthermore, attempt to get good color combinations. The heights to which the plants will grow should be known, otherwise the taller ones may be in front

and the more dwarf ones in the background. It is always well in an informal border to let the back line be somewhat broken by setting plants at some points that are a little shorter.

SITUATION OF BORDER

Choose a southern exposure where it is not in too close proximity to large tree roots. It should be somewhat protected from the direct force of the wind, otherwise fragile flowers will not be very lasting. Most perennials enjoy a medium light loam.

PREPARATION OF SOIL

As with annuals, but perhaps more so with perennials, the soil for borders should be deeply and thoroughly prepared; 2 to 3 ft. is none too deep, for plants must remain in one place for a long time. In the case of Peonies it is detrimental to move them often and it is frequently two years, and in some soils three years, after moving a Peony plant before it blooms normally. Manure and a complete fertilizer should be well worked into a new border. All perennial borders profit by an application of bonemeal, hardwood ashes and sheep manure every year or two. Perennial borders which have been flowering year after year and to which much manure has continually been added, become somewhat sour and an application of slaked lime every two years is very beneficial. Many of the perennials do not attain their proper maturity before the Winter when they have been excessively fertilized and forced into continued sappy growth. They then suffer from cold. All soils for borders should be loose, so that they can be easily kept stirred. Soils are made light or loosened by manure, sand or fine coal ashes. Clay soils surely need some such treatment.

PLANTING

A rule which has been given in setting perennials is to put them a trifle closer than half their height. For example, Columbine grows 2 ft. tall; for good clumps place young plants 1 ft. apart. This rule will not apply in subsequent years, for as the plants grow they must be thinned out. A good liberal planting is always the better plan.

Plants should usually be set a little deeper than they were when growing in the nursery. Care must be exercised not to bury them too deeply, however, for some perennials, as Violets and Bearded Iris, are almost surface creepers. In placing the perennials in the soil, spread the roots symmetrically; do not wad them and cram them into a little hole.

SPRING PLANTING

The planting of perennials is best done in Spring when the tops are just about to start into growth. There is danger in planting when the soil is too moist, especially in clayey soils, which if they become caked are difficult to pulverize during the whole growing season.

AUTUMN PLANTING

In the Autumn most perennials can be transplanted successfully if set out in time so that their roots get established before cold weather.

If perennials must be moved in full growth they should always be cut back; especially is this the case when much soil is removed from the roots. All newly set stock should be watered. There is usually less work in Autumn than in the Spring, hence this season is often preferred for planting.

CULTIVATION

Through the growing season the surface soil should be loosened that air may enter in order to encourage root action, as well as to conserve the moisture, and keep the weeds in check. Lawn clippings are valuable as a Summer mulch to conserve moisture. We very strongly recommend well decayed stable manure and leafmold, where these are obtainable.

WATERING

Watering, although beneficial, is less necessary if the soil is always kept loose. In dry seasons water may be applied, using plenty at one time. Little drippings of water are bad for all plants, for such a method of watering only destroys the surface looseness. Syringing the foliage is beneficial; in many cases it serves to keep insects in check if done vigorously. Wherever possible, water pipes should be laid with faucets at regular intervals for use in the garden.

STAKING

Many of the perennials will become tall and some support will be necessary. Do not make it conspicuous. Paint the stake green and tie with green cord or raffia, but do not use an old mop handle nor tie with brilliant calico. A light, but long stake placed at the center of the plant is effective. Twiggy branches of trees may also be used. In that case scarcely any tying is needed. Let the stakes be placed early; when the plants have made a great growth they cannot be effectively supported, so that a natural appearance is lost. The whole beauty of a garden is frequently marred by the absence of stakes or a poor method of staking.

REMOVAL OF OLD FLOWERS AND SEED PODS

All old flowers, seed pods and dead leaves should be removed from time to time. They should be burned. Old flowers harbor thrips, a very minute insect which is usually found in the heart of a Rose bloom, they cause a shabby appearance of the petalage. Seed production is a most debilitating process; the plant therefore should be prevented from

doing this excessive labor. When the old flowers are picked the energies are often turned to a second crop of bloom. Many dead leaves are diseased and are a menace to the other plants. Besides this, old flowers, dead leaves and seed pods give an air of untidiness to the garden.

The Propagation of Perennials is discussed in a separate chapter, "Plant Propagation" (see Contents).

NECESSITY FOR REPLANTING

Some of the later blooming perennials, especially *Helianthus*, *Rudbeckia*, *Asters*, *Boltonia*, *Physostegia*, *Achillea*, need to be replanted or parts of them removed each year. Five to eight shoots of these perennials can be left and the rest dug up and moved to another place. This is the only way to keep some of the weedier growers in subjection. Perennials which bloom from crowns in the early Spring are usually impatient of being moved often, examples being *Bleedingheart*, *Oriental Poppy*, *Gasplant*, *Torchlily*, and *Peony*. *Iris* reproduces rapidly and is best divided every two or three years; *Phlox* every three or four years and *Peony* only every three to five years. Many perennials, as *Delphinium* and *Columbine*, increase by a gradual enlargement of the crown.

*For a worthy book on hardy flowers,
we recommend*

THE BOOK OF PERENNIALS, by ALFRED C. HOTTES

The first several chapters are devoted to the general principles of growing, using, selecting and propagating perennials. Then follow a number of comprehensive lists of perennials suited for different locations and purposes, after which the most important and useful representatives of this popular class of garden plants—to the number of over 125 separate species and many more varieties—are discussed individually, together with their culture and requirements. The volume is marked by the same liberal use of illustrations and by the simple, practical language that make Mr. Hottes' writings both interesting and instructive for amateur as well as professional.

Secure your copy where you bought your Garden Guide



LIST OF THIRTY INDISPENSABLE HARDY PERENNIALS Judged from hardiness, color, profusion of bloom or seasonal value.

1. TEN TALL (Above 3½ ft. tall)

- Althaea rosea* (Hollyhock). Great range of colors.
- Anchusa italica* (Italian Bugloss). Deepest blue.
- Aster*. Tall species (not China-aster) often called Michaelmas-daisies.
- Delphinium* (Hardy Larkspur). Deepest blues. Splendid for backgrounds and cut flowers.
- Digitalis purpurea* (Foxglove). Shirley hybrids best.
- Echinops ritro* (Steel Globethistle). Spherical, spiny heads. Steel-blue, spiny leaves.
- Helianthus decapetalus* (Golden Thinleaf Sunflower).
- Rudbeckia laciniata* (Goldenglow). Very tall. Golden yellow flowers. Inclined to be weedy.
- Thalictrum glaucum* (Dusty Meadowrue). Grey foliage which is very graceful.
- Yucca flaccida*. Tall spikes of white flowers.

2. TEN MEDIUM TALL (Between 1½-3½ ft. tall)

- Anemone japonica* (Japanese Anemone). Chosen as the best late white flower.
- Aquilegia chrysantha* (Yellow Columbine). Long spurred, golden yellow flowers.
- Campanula persicifolia* (Peachleaf Bellflower). Blue and white flowers. Erect growth.
- Delphinium Belladonna* (Belladonna Larkspur). Soft blue flowers. Useful for cutting.
- Dianthus barbatus* (Sweet-william). Various colors. Showy. Good in garden or as a cut flower.
- Gypsophila paniculata* (Ehrlei Double Babysbreath). Splendid for combining with other cut flowers.
- Iris germanica* (Bearded Iris). Numerous excellent varieties in many colors. Easy of culture.
- Papaver orientale* (Oriental Poppy). Gorgeous scarlet or orange flowers.
- Paeonia albiflora* (Chinese Peony). Numerous excellent varieties. Masses of color for cutting and garden.
- Phlox suffruticosa* (Miss Lingard Phlox). A pure white Phlox with delicate lavender eye.

3. TEN DWARF (Below 1½ ft. tall)

- Arabis alpina* (Rockcress). Pure white flowers appearing in early Spring.
- Dianthus plumarius* (Grass Pink). Fragrant gay border plants or cut flowers.
- Geum coccineum* (Avens). Clear scarlet. Likes sun.
- Heuchera sanguinea* (Coralbells). Long, graceful spikes of scarlet, pink, and white flowers.
- Iberis sempervirens* (Hardy Candytuft). Excellent, pure white flowers.
- Iris chamaeiris* (Dwarf Iris). Good purples, yellows and white.
- Nepeta mussini* (European Catmint). Long season of violet blue flowers.
- Phlox subulata* (Moss Phlox). Creeping to form mats of pink, lilac and white flowers.
- Primula polyantha* (Polyantha Primrose). Splendid range of pure colors.
- Medum spectabile* (Showy Stonecrop). Fleshy leaves. Variety Brilliant to be chosen.

GENERAL SELECTION OF HARDY PERENNIALS

†For cutting. o For rock garden. *Shade enduring. ‡For moist ground.

TALL PERENNIALS (Above 3½ ft. tall)

- †*Achillea filipendulina* (Fernleaf Yarrow).
- *†*Aconitum autumnale* (Autumn Monkshood).
- **Aconitum fischeri* (Azure Monkshood).
- **Aconitum lycoctonum* (Wolfbane).
- Althaea rosea* (Hollyhock).
- **Anchusa italica* (Italian Bugloss).
- *†*Artemisia lactiflora* (Hawthorn Mugwort).
- **Aruncus sylvestris* (Common Goatsbeard).
- *†*Asters*, numerous species (Michaelmas-daisy).
- *†*Bocconia cordata* (Plumepoppy).
- Boltonia asteroides* (Boltonia).
- *†*Campanula pyramidalis* (Chimney Bellflower).
- †*Cimicifuga racemosa* (Bugbane).
- †*Delphinium hybrids* (Hardy Larkspur).
- *†*Digitalis purpurea* (Foxglove).
- †*Echinops ritro* (Globethistle).
- †*Helianthus maximiliani* (Maximilian Sunflower).
- †*Helianthus orgyalis* (Narrowleaf Sunflower).
- †*Lupinus polyphyllus* (Perennial Lupin).
- †*Rudbeckia laciniata* (Goldenglow).
- Verbascum olympicum* (Olympic Mullein).

MEDIUM TALL PERENNIALS (1½-3½ ft.)

- †*Achillea ptarmica* (Sneezewort).
- o†*Aconitum napellus* (Monkshood).
- †*Anthemis tinctoria* (Camomile).
- *o†*Anemone japonica* (Japanese Anemone).
- *o†*Aquilegia canadensis* (American Columbine).
- *o†*Aquilegia caerulea* (Colorado Columbine).
- *o†*Aquilegia chrysantha* (Golden Columbine).
- *o†*Aquilegia vulgaris* (European Columbine).
- †*Asclepias tuberosa* (Butterflyweed).
- o†*Aster ptarmicoides* (White Upland Aster).
- **Baptisia australis* (Blue Wild-indigo).
- o†*Campanula glomerata* (Danesblood).
- †*Campanula medium* (Canterbury-bells).
- †*Campanula medium* var. *calycanthema* (Cup-and-saucer Bellflower).
- †*Campanula persicifolia* (Peachleaf Bellflower).
- †*Campanula trachelium* (Coventry-bells).
- o*Callirhoe involucrata* (Poppy-mallow).
- o†*Centaurea dealbata* (Persian Centaurea).
- o†*Centaurea montana* (Mountain-bluet).
- o†*Centranthus ruber* (Jupitersbeard).
- †*Chrysanthemum coccineum* (Pyrethrum).
- o*Clematis davidiana* (Fragrant Tube Clematis).
- Clematis recta* (Ground Clematis).

GENERAL SELECTION OF HARDY PERENNIALS—Continued

- †*Coreopsis lanceolata* (Tickseed).
- o†*Coreopsis verticillata* (Threadleaf Coreopsis).
- *o*Corydalis nobilis* (Siberian Corydalis).
- †*Delphinium Belladonna* (Belladonna Larkspur).
- †*Dianthus barbatus* (Sweet-william).
- *o†*Dicentra spectabilis* (Bleedingheart).
- *o†*Dictamnus albus* (Gasplant).
- o†*Doronicum caucasicum* (Leopardbane).
- o*Dracocephalum moldavicum* (Dragonhead).
- †*Echinacea purpurea* (Hedgehog-coneflower).
- Epilobium angustifolium* (Blooming Sally).
- o†*Erigeron speciosus* (Fleabane).
- o†*Eryngium planum* (Eryngo).
- *†*Eupatorium purpureum* (Joe-pye-weed).
- *†*Eupatorium perfoliatum* (Boneset).
- o†*Euphorbia corollata* (Flowering Spurge).
- †*Filipendula hexapetala* (Dropwort).
- †*Gaillardia aristata* (Blanketflower).
- o*Galega officinalis* (Goatsrue).
- *o†*Galium boreale* (Bedstraw).
- †*Gypsophila paniculata ehrlei* (Double Babysbreath).
- *†*Helenium autumnale* (Helensflower).
- †*Helianthus maximiliani* (Maximilian Sunflower).
- †*Helianthus mollis* (Ashy Sunflower).
- *†*Hemerocallis aurantiaca* (Orange Daylily).
- *†*Hemerocallis flava* (Lemon Daylily).
- *†*Hemerocallis fulva* (Tawny Daylily).
- *†*Hemerocallis thunbergi* (Japanese Daylily).
- †*Hesperis matronalis* (Dames Rocket).
- †*Iris germanica* (Bearded Iris).
- ††*Iris kaempferi* (Japanese Iris).
- ††*Iris pseudacorus* (Yellowflag Iris).
- o†*Iris sibirica* (Siberian Iris).
- †*Liatris pycnostachya* (Cattail Gayfeather).
- *††*Lobelia cardinalis* (Cardinalflower).
- *†o†*Lobelia siphilitica* (Large Blue Lobelia).
- †*Lychnis chalcidonica* (Maltese Cross).
- o†*Lysimachia clethroides* (Clethra Loosestrife).
- ††*Lythrum salicaria* (Purple Loosestrife).
- *o†*Mertensia virginica* (Virginia Bluebells).
- *††*Monarda didyma* (Beebalm).
- o*Oenothera missouriensis* (Ozark Sundrops).
- †*Paeonia albiflora* (Chinese Peony).
- †*Paeonia officinalis* (Common Peony).
- †*Paeonia tenuifolia* (Fringed Peony).
- †*Papaver orientale* (Oriental Poppy).
- †*Pentstemon torreyi* (Torrey Beardtongue).
- †*Pentstemon gloxinoides* (Gloxinia Beardtongue).
- †*Phlox decussata* (Hardy Phlox).

GENERAL SELECTION OF HARDY PERENNIALS—*Continued*

- †Phlox glaberrima suffruticosa (Smooth Phlox).
- †Physostegia virginiana (False-dragonhead).
- o†Platycodon grandiflorum (Balloonflower).
- †Salvia azurea (Blue Sage).
- †Salvia farinacea (Mealycup Sage).
- o†Scabiosa caucasica (Caucasian Scabiosa).
- Sidalcea candida (Prairie-mallow).
- *Smilacina racemosa (False Solomonseal).
- o†Thalictrum aquilegifolium (Columbine Meadowrue).
- o†Thalictrum dipterocarpum (Yunnan Meadowrue).
- Thermopsis caroliniana (Carolina Thermopsis).
- *†Tradescantia virginiana (Spiderwort).
- o†Veronica longifolia subsessilis (Clump Speedwell).

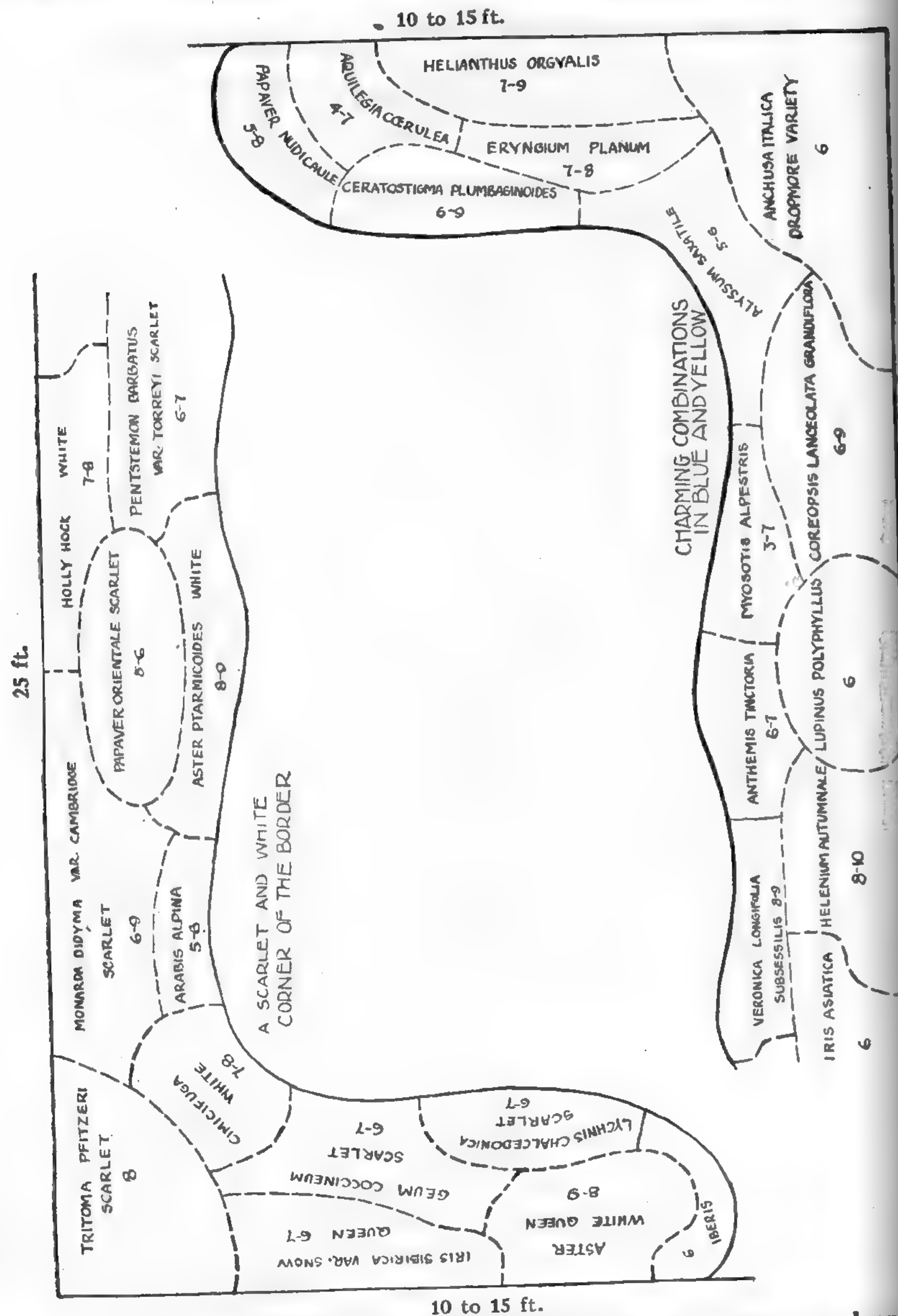
DWARF PERENNIALS (Less than 1½ ft.)

- †*oAegopodium podagraria (Goutweed).
- *oAjuga reptans (Carpet Bugle).
- *oAjuga genevensis (Geneva Bugle).
- o†Alyssum rostratum (Yellowhead Alyssum).
- o†Alyssum saxatile (Goldentuft).
- oArabis albida (Wallcress).
- oArmeria (See Statice).
- o†Asperula odorata (Sweet Woodruff).
- oAubrietia deltoidea (Purple-rockcress).
- o†Campanula carpatica (Carpathian Bellflower).
- oCampanula rotundifolia (Harebell).
- oCerastium tomentosum (Snow-in-summer).
- oChrysanthemum arcticum (Arctic Daisy).
- o†Chrysanthemum maximum (Shasta Daisy).
- *oClaytonia virginica (Springbeauty).
- oCoronilla varia (Crownvetch).
- oDianthus deltoidea (Maiden Pink).
- oDianthus latifolius (Double Cluster Pink).
- o†Dianthus plumarius (Grass Pink).
- *oDicentra eximia (Fringed Bleedingheart).
- *oDicentra cucullaria (Dutchmans-breeches).
- o†Epimedium macranthum (Longspur Epimedium).
- *oGentiana andrewsi (Closed Gentian).
- oGeranium sanguineum (Bloodred Cranesbill).
- oGeum coccineum (Avens).
- oHelleborus niger (Christmas-rose).
- *oHepatica triloba (Liverwort).
- o†Heuchera sanguinea (Coralbells).
- †*oHosta (Funkia) caerulea (Blue Plantainlily).
- †*oHosta (Funkia) lancifolia (Lanceleaf Plantainlily).
- oIberis sempervirens (Evergreen Candytuft).
- oIncarvillea delavayi.
- oIris chamaeiris (Crimean Iris).
- oIris cristata (Crested Iris).

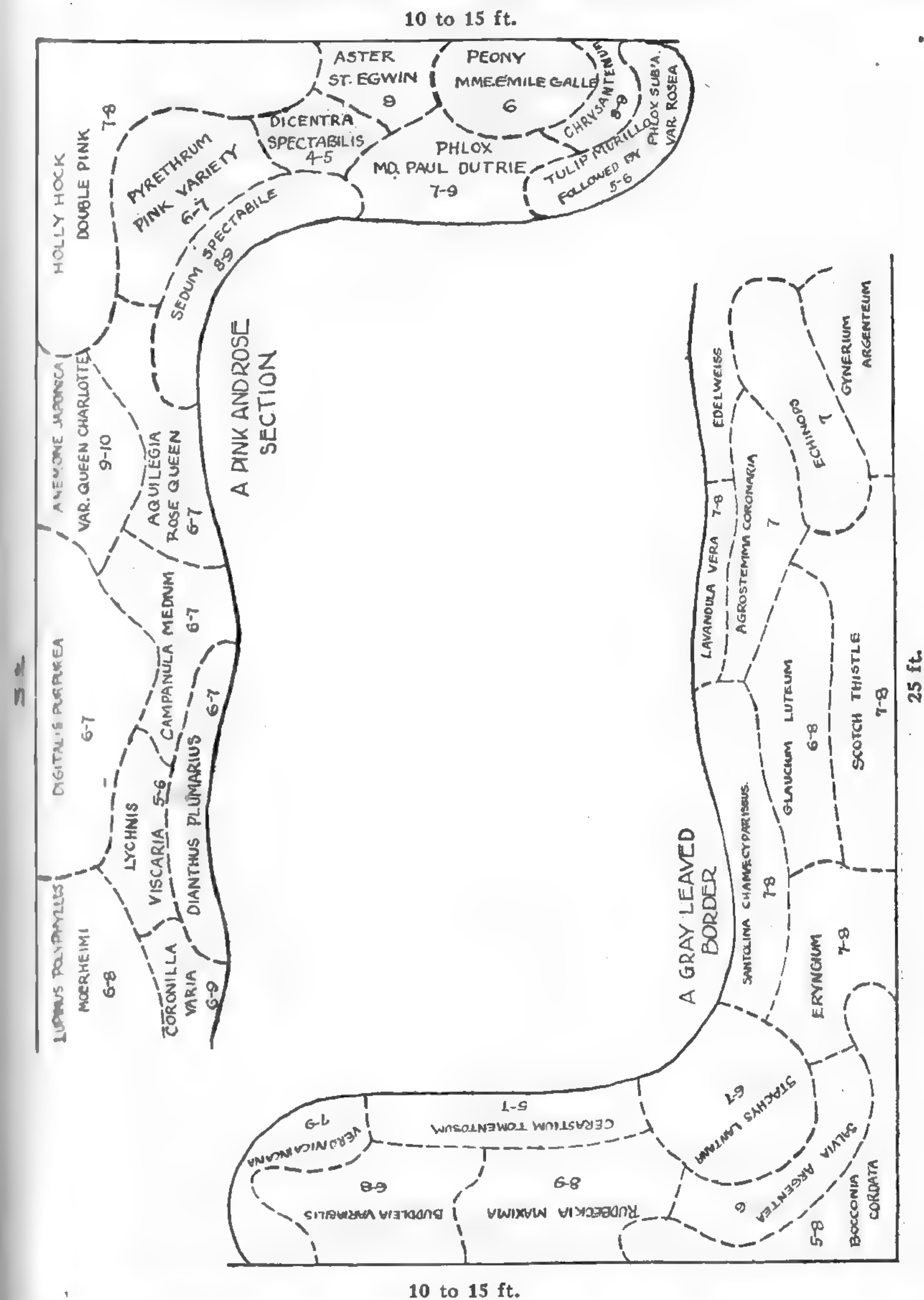
GENERAL SELECTION OF HARDY PERENNIALS—*Continued*

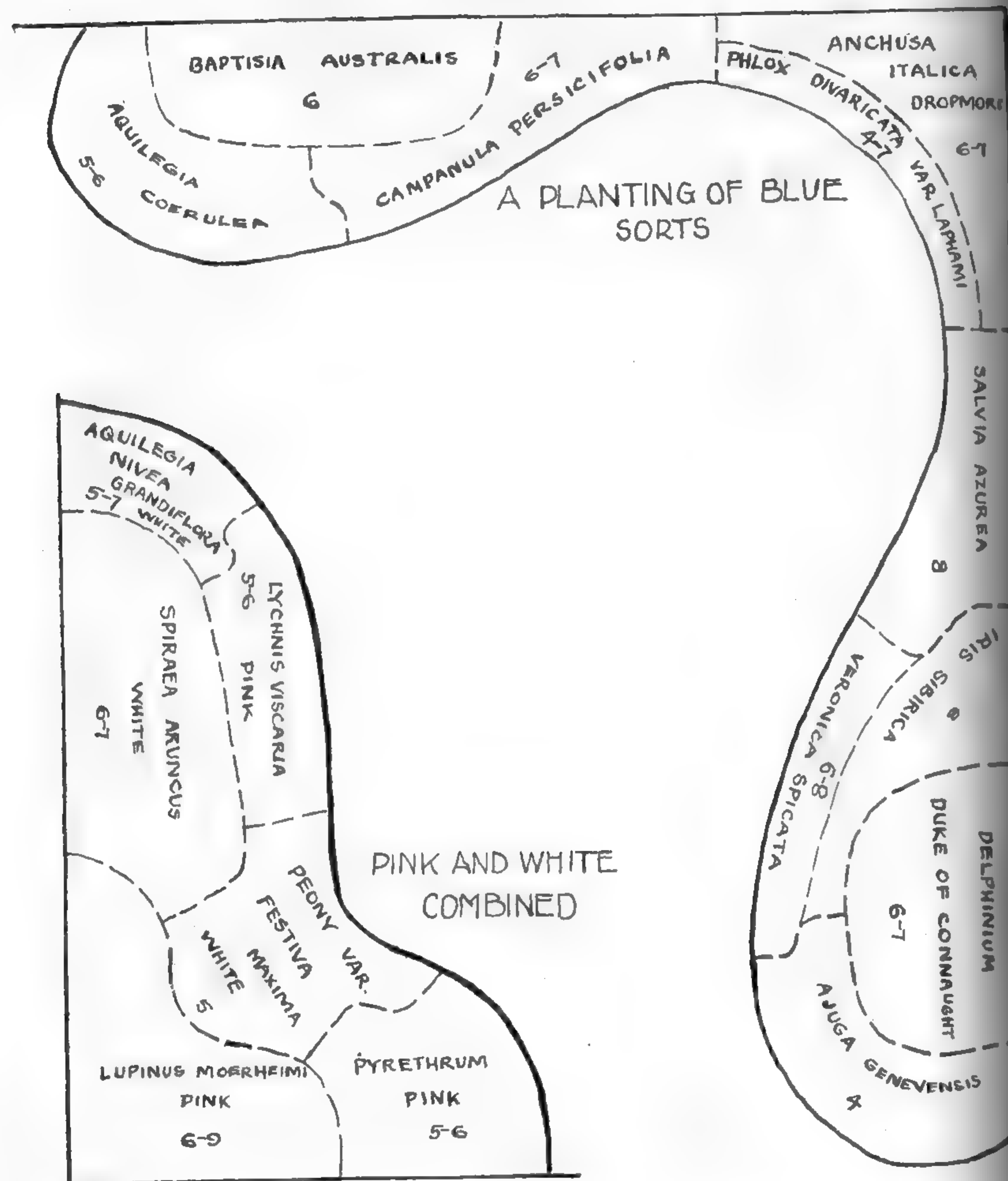
- oIris verna (Vernal Iris).
- o†Limonium (Statice) latifolium (Bigleaf Statice).
- o†Lychnis coronaria (Rose Campion).
- oOpuntia vulgaris (Pricklypear).
- oPapaver nudicaule (Iceland Poppy).
- *o†Phlox divaricata (Blue Phlox).
- *oPhlox subulata (Moss Phlox).
- oPlumbago larpentae (Larpente Plumbago).
- †*oPodophyllum peltatum (Mayapple).
- oPolemonium caeruleum (Greek-valerian).
- oPotentilla, Miss Willmott (Cinquefoil).
- oPrimula japonica (Japanese Primrose).
- *oPrimula polyantha (Polyantha Primrose).
- oPrimula vulgaris (English Primrose).
- oPulmonaria saccharata (Bethlehem Lungwort).
- o†Ranunculus aconitifolius florepleno (Double Aconite Buttercup).
- o†Ranunculus acris florepleno (Double Tall Buttercup).
- oSagina subulata (Pearlwort).
- oSaxifraga cordifolia (Heartleaf Saxifrage).
- oSedum acre (Goldmoss).
- oSedum caeruleum (Blue Stonecrop).
- oSedum kamtschaticum (Orange Stonecrop).
- oSedum reflexum (Jenny Stonecrop).
- *oSedum sarmentosum (Stringy Stonecrop).
- oSedum sexangulare (Hexagon Stonecrop).
- oSedum sieboldi (Siebold Stonecrop).
- oSedum spectabile (Showy Stonecrop).
- oSedum stoloniferum (Running Stonecrop).
- oSempervivum arachnoideum (Spiderweb Houseleek).
- oSempervivum tectorum (Roof Houseleek).
- o†Statice pseudoarmeria (False Thrift).
- o†Stokesia laevis (Stokes-aster).
- *oTrillium grandiflorum (Snow Trillium).
- †*oTrollius europaeus (European Globeflower).
- oTunica saxifraga (Tunicflower).
- oVeronica rupestris (Rock Speedwell).
- o†Viola cornuta (Jersey Gem Viola).



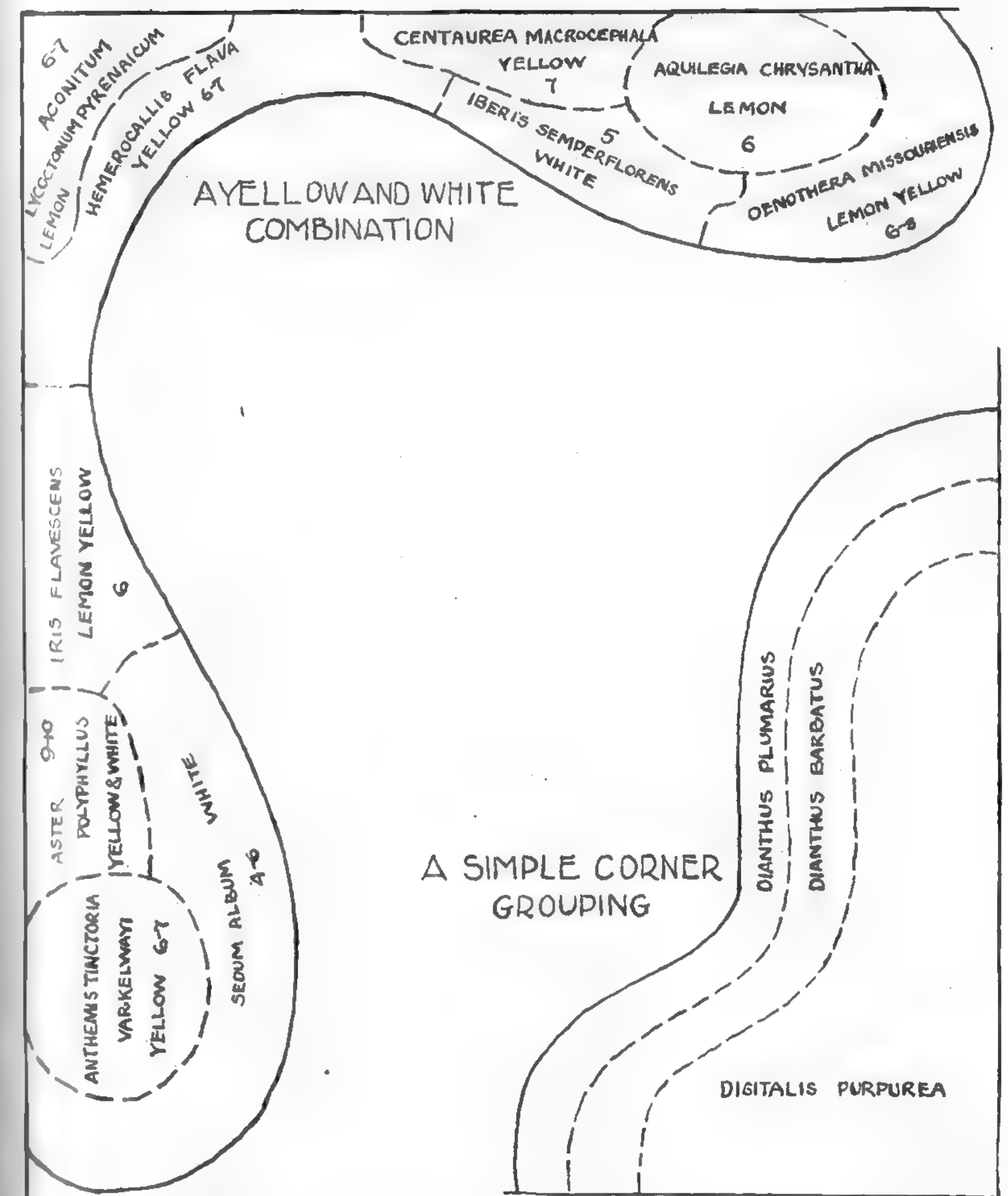


The four perennial border plantings illustrated on these two pages are planned to cover areas 25 ft. the long way, 10 to 15 ft. the short way and from 3 to 4 ft. in width.





These border plans are simpler than those shown on pages 158 and 159. Such plans can be adapted to various size plots by making the masses of each perennial large



or small as the space permits. The numbers accompanying the plant names refer to the months during which the plants bloom; thus, 5-6 stands for May and June

GERMINATION TABLE OF FLOWER SEEDS

*Represents an indefinite number of days

†Represents seeds which may be sown in Fall

‡Represents seeds which sometimes self-sow

-Represents seeds which are difficult to transplant

Days	Days	Days
Abutilon.....20	Coleus.....20	Japanese Bean.....15
Acroclinium.....15	‡Columbine.....15	Japanese Hop.....15
African Golden Daisy..15	Commelina.....10	Japan Iris.....*50
Agapanthus.....20	†Coreopsis.....20	Jerusalem-cherry....*20
Agathaea coelestis....20	Cornflower Aster.....*	Jobs-tears.....*
Ageratum.....5	‡Cosmos.....5	Kenilworth-ivy.....5
††Alyssum.....5	Crimson Flax.....8	††Kochia scoparia.....15
Ampelopsis.....15	Cuphea.....*8	Kudzu-vine.....15
†Anchusa.....20	Cyclamen.....25	Lantana.....15
Anemone, St. Brigid..15	Cyperus alternifolius..25	†Larkspur.....15
†Antirrhinum.....20	Cypressvine.....5	†Lathyrus.....25
Aquilegia.....15	Dahlia.....5	Lavender.....20
Arctotis grandis.....20	Daisy.....20	Lemon-verbena.....8
Asparagus.....30	Datura.....15	Linaria.....5
Aster.....8	†Delphinium.....15	Linum.....8
Aster, Perennial.....15	Dianthus.....5	Lobelia.....8
††Babysbreath.....20	†Digitalis.....20	†-Love-in-a-mist.....8
Ball of Fire.....15	Dimorphotheca.....15	Lychnis.....20
††Bachelor Button.....*5	Dolichos.....15	Mallow Marvels....*15
Balloonvine.....25	Dusty-miller.....*5	Marigold.....5
†Balsam.....10	†Echinocystis.....*30	Marvel of Peru.....5
Begonia.....15	English Double Daisy..5	Maurandia.....*25
†Bellis perennis.....5	-Eschscholtzia.....5	Mexican Fireplant....20
Boston Ivy.....15	Euphorbia.....20	Mesembryanthemum...*5
Blanketflower.....20	Evening-primrose....5	-Mignonette.....5
Blue-eyed Daisy.....20	Everlasting Flowers...*	Mimosa.....8
Blue Dayflower.....20	†Feverfew.....20	Mimulus.....8
Blue Salvia.....*15	Fire-cracker Plant....*8	Mina lobata.....5
Brachycome.....8	Fire-on-the-mountain..20	Mirabilis.....5
Brazilian Morning-glory.....8	††Forget-me-not.....15	Monkeyflower.....20
†Browallia.....20	Four-o'clock.....5	-Moonvine.....20
Brugmansia arborea...15	†Foxglove.....20	Morning-glory.....5
Bush-eschscholtzia...*	Fuchsia.....*30	Mountain Honey-suckle.....20
Butterfly-pea.....15	Gaillardia.....20	Mourning Bride.....20
Cactus.....30	Geranium.....20	Muskplant.....20
††Calendula.....10	Gloxinia.....15	Nasturtium, Dwarf
-California Poppy.....*	Godetia.....15	Tall.....8
Campanula.....*	Gourds.....15	†Nicotiana.....20
Canary-bird Flower...*	Grass Seed.....*	Nigella.....8
††Candytuft.....5	Gypsophila.....20	Oenothera.....5
Cannas.....*15	Helianthus.....15	Ornamental Grasses...*
Canterbury-bells....*15	Helichrysum.....5	Ostrich Plume.....20
Cardinal Climber.....5	Heliotrope.....15	Oxalis.....20
Carnation.....*	Heuchera sanguinea...20	Palm.....15
Carnation, Perennial..8	Hibiscus.....*15	Painted-tongue.....5
Castor Bean.....15	†Hollyhock.....5	†Pansy.....8
Celosia.....20	Hop, Japanese.....15	Passionflower.....50
†Centaurea.....*5	Horn-of-plenty.....15	Pea, Sweet.....15
Centrosema.....15	Humbleplant.....8	Pelargonium.....20
Chinese Bellflower....20	-Hunnemannia.....8	Pentstemon.....20
Christmas Orchid	Hyacinth-bean, Japa-15	Perennial Pea.....25
Flower.....20	nese.....15	†Petunia.....20
Chrysanthemum.....5	Iceplant.....*5	Pheasant-eye Pink....5
Cigar Plant.....*8	Impatiens sultani....15	Phlox.....20
Cineraria.....5	Ipomoea.....5	Pinks.....5
Clematis, Tuberous...*30	Iris.....*50	Platycodon.....30
Cleome pungens.....20	Ivies.....*	†-Poppy.....20
Cobaea scandens.....15	Jack-and-the-beanstalk.....15	†Portulaca.....20
Cockscomb.....20		
Coix lacryma.....*		

-Continued

Days	Days	Days
Primrose.....*15	Shasta Daisy.....20	†Sweet-william.....10
Primula.....*15	Smilax.....15	Ten-weeks Stocks.....
Pueraria thunbergiana.15	†Snapdragon.....20	Umbrella Plant.....
Ragged-robin.....20	Solanum.....*20	†Verbena.....8
Ricinus.....15	Spiderflower.....20	Vinca.....*
Rose.....*	Stocks.....5	Viola.....*
†Rose, Moss.....20	Stokesia.....*	Violet.....*
Salpiglossis.....5	Strawflower.....5	Wallflower.....5
Salvia.....*15	†Summer Bush Cypress.15	Waterlily.....*
Scabiosa.....20	Sunflower.....15	Wedding Bells.....15
Scarlet Runner.....8	Sun Plant.....20	†Wild Cucumber Vine.*30
Scarlet Sage.....*15	Swan-river-daisy.....8	Youth and Old Age...5
Schizanthus.....20	†Sweet Pea.....15	Yucca.....*
Sensitiveplant.....20	Sweet-sultan.....*5	Zinnia.....5

These figures are only approximate and do not apply to all families of plants. Seeds of many shrubs and trees, as well as numerous hardy perennials, may lay dormant for 12 months and even two years. Furthermore, temperature and soil moisture play a big part. Even members of one family vary greatly. The seed of English Primrose, if fresh, will germinate within ten days if sown in early Spring in a coldframe; sown in July, the same seed will probably lay dormant until the next Spring. Some of the Asiatic Primroses will not germinate for months and may lay three years before appearing.



Chapter XII

ANNUALS AND BIENNIALS

By T. A. WESTON

Care in Purchasing Seed—Sowing Annuals—Transplanting—
Time to Sow Out-of-Doors—Keeping Seed Pods Removed—
Vines—Combinations of Annuals—Everlasting Flowers—
Annuals for Cut Flowers—Lesser Known Annuals—Annuals
for Edging Beds of Other Plants—Foliage Annuals—Biennials

ANNUALS are plants the seed of which must be sown each year. Some plants, although they live more than one year, are not at their best after the first year and should be considered as annuals. The Pansy is such a plant; it is perennial, but is best when sown each year. Annuals are not permanent, it is true, but they fill a great need for profusion of bloom for garden effect. In no way can a few cents be spent so profitably as in the purchase of a package of seeds of annuals. They bloom so quickly and make such excellent fillers for the bare spots between our shrubs and other perennial plants that they are truly indispensable. For cut flowers they are unexcelled; sorts may be easily chosen with long, strong stems and excellent keeping qualities, together with the daintiest or gayest colors. They commend themselves to planting near rented houses where investments for plants would otherwise be somewhat wasted.

For pot culture upon porches and areas where little space is available the annual fits in nicely. In window boxes the dwarf, compact plants are just as useful as the tall climbers. The annual vines are unrivaled in their ability quickly to cover unsightly buildings or rough ground, as well as serving for shade upon rustic arbors and porches.

CARE IN PURCHASING SEED

The buying of flower seeds is an investment to be undertaken with unusual discretion. Seeds should be bought only from reliable dealers who handle, in the right way, seeds procured from the best sources. Reliable seed growers carefully remove all inferior and untrue types while their stocks are in bloom. The matter of getting good seed must

depend entirely upon our confidence in the dealer and the wise gardener therefore buys from the bonafide seedsman rather than the ten cent or grocery stores.

SOWING ANNUALS

Many annuals, such as Petunia, Phlox, Verbena, ornamental Tobacco, early Asters, Antirrhinum, Cosmos, Sweet Alyssum, Stocks, Larkspur, Salpiglossis, Scarlet Sage, Nemesis, Heliotrope and Torenia, benefit by being sown indoors, otherwise they are apt to be late in flowering. For such seeds March is the best time to sow. This necessitates procuring a good loam in the Autumn and storing it in the basement. The soil need not be rich, but it should be loose, which can be accomplished by the addition of well-rotted leafmold and, if the soil is at all heavy, a good proportion of sand. This soil should not be allowed to become dry, but should be moistened every month or oftener according to its condition. It must not be kept too wet, otherwise it will sour badly.

Seed must always be sown thinly; thick sowing is a general cause of failure with annuals. Some seeds, as Petunia, ornamental Tobacco, Salpiglossis and Portulaca, are very minute, and should not be covered with soil. A newspaper and a pane of glass placed over the pot or box will retain the moisture and keep the sunlight from the seed. Always see that the soil is thoroughly watered but fully drained before sowing. Larger seeds are best sown in rows and should be covered with soil about three times their diameter. To keep out the light and prevent the pots from drying the use of newspaper over the pots is excellent. As soon as the seedlings get above the soil, they should be given the best light conditions, otherwise they will become very spindling and weak. Good light and rather cool conditions indoors, together with thorough but not too frequent watering, should produce stocky plants.

Excepting such as Mignonette, Sweet-sultan, Love-in-a-mist, Heliotrope, and the Poppylike plants, as Eschscholtzia, Argemone and Papaver, most annuals can be successfully transplanted. When seeds of these latter are sown indoors, they are best placed in very small pots, using only two or three seeds in a pot.

TRANSPLANTING

Seedlings may be transplanted when very small; in fact, after the appearance of several leaves, if the plants are becoming crowded, they

should be transplanted into boxes about 3 in. deep, setting them to 3 in. apart according to the class of plant and the time they will stay in the boxes. Transplanting is beneficial to many seedlings because it causes the root tips to branch, making a well balanced root system.

TIME TO SOW OUT-OF-DOORS

When the soil is warmed a little in the Spring most annuals can be sown directly in the open soil; but a few are tender, that is, they will not stand frost after germinating and should not be sown until late April. Among these are: Amaranth, Browallia, Celosia, Torenia, Nemesis, Gourds and Schizanthus. Such subjects as indicated are better sown indoors.

There are two methods of sowing, either in a well prepared sheltered seed bed from which the young plants may be shifted when large enough, or in positions where they are to flower. Except those subjects which do not transplant well, the bed system is best. If not sown thickly, they can stand until wanted for filling gaps in the border. For definite beds of annuals, sowing where they are to flower is satisfactory if the plants are duly thinned out. Many annuals need as much as 18 to 24 in. of space; others of a dwarf character no more than 6 in. Some varieties of annuals are better for having the tops pinched off when 4 to 6 in. tall; this will make them branch and as a result produce many more flowers. Stocks, Godetia, Chrysanthemum, Clarkia, Cosmos, Calendula, Mignonette, Larkspur and many others are of this character.

KEEPING SEED PODS REMOVED

Annuals soon develop full growth and hastily decline if their seed pods are not carefully removed. Many of them may continue to bloom throughout the Summer if careful attention is given this detail.

VINES

The annual vines form an important garden adjunct. The most important plant in this class is the Sweet Pea (*See Contents*) perhaps; the next in value is the Nasturtium, which not only has excellent foliage, but at the same time is without a competitor for profusion and elegance of bloom. The Morning-glory (*Convolvulus*) would be more valued but for the fact that inferior varieties are too often grown. Excellent giant forms, clear blue in color, are on the market, which for a morning effect upon the garden fence are very attractive. The

Cobaea is really a tender perennial, but does best sown in pots and started indoors each year. The seeds are flat and should be planted edgewise. The flowers are greenish purple and followed by attractive pods. The plants make a phenomenal growth. Another vine with inflated pods is the Balloonvine. Although the flowers are inconspicuous, the balloons are borne very freely. The Cypressvine and the Cardinal Climber both possess deep red flowers and fine foliage. The seeds of both are rather difficult to start, but if those of the Cypressvine are scalded there should be little difficulty. The familiar Hop, Scarlet Runner Bean and Gourds should not be forgotten. If one prefers something rather extraordinary and unique, the Canary Bird Vine (*Tropaeolum peregrinum*) with its peculiar yellow fringed flowers and delicate foliage, should be grown.

COMBINATIONS OF ANNUALS

It is not usually advisable to buy annuals in mixed colors; it is much better to buy packages of good distinct colors and plant according to fancy. Masses of one color are most effective in beds but there are some subjects, both annual and perennial, which are not generally offered in separate colors.

Let us make a few recommendations for combinations of annuals or ways in which they give the best effects:

In making beds for annuals these should not be too wide; if against a fence, 4 or 5 ft., and if in the open, 6 or 7 ft., is sufficient; otherwise, they cannot be handled easily either for picking the flowers or for cultivating and weeding. Few annuals can be sown so that they are exactly the proper distance apart when they bloom. They must, therefore, be thinned. According to the variety they all need from 6 to 24 in. of space. Poppy beds are usually too thickly planted, for Poppy seed is very small and difficult to sow evenly. They must be thinned if the plants are to attain their proper development.

A bed of blue Bachelor Buttons can be nicely edged with Sweet Alyssum or Candytuft, both of the latter being white. The Bachelor Buttons will furnish a constant supply of cut flowers.

Snapdragon, of which a delicate pink variety, perhaps, is chosen, will be excellent combined with Dusty-miller.

Another bed will be showy, composed of California Poppies planted in front of the taller Calendulas. This will be in tones of orange-yellow.

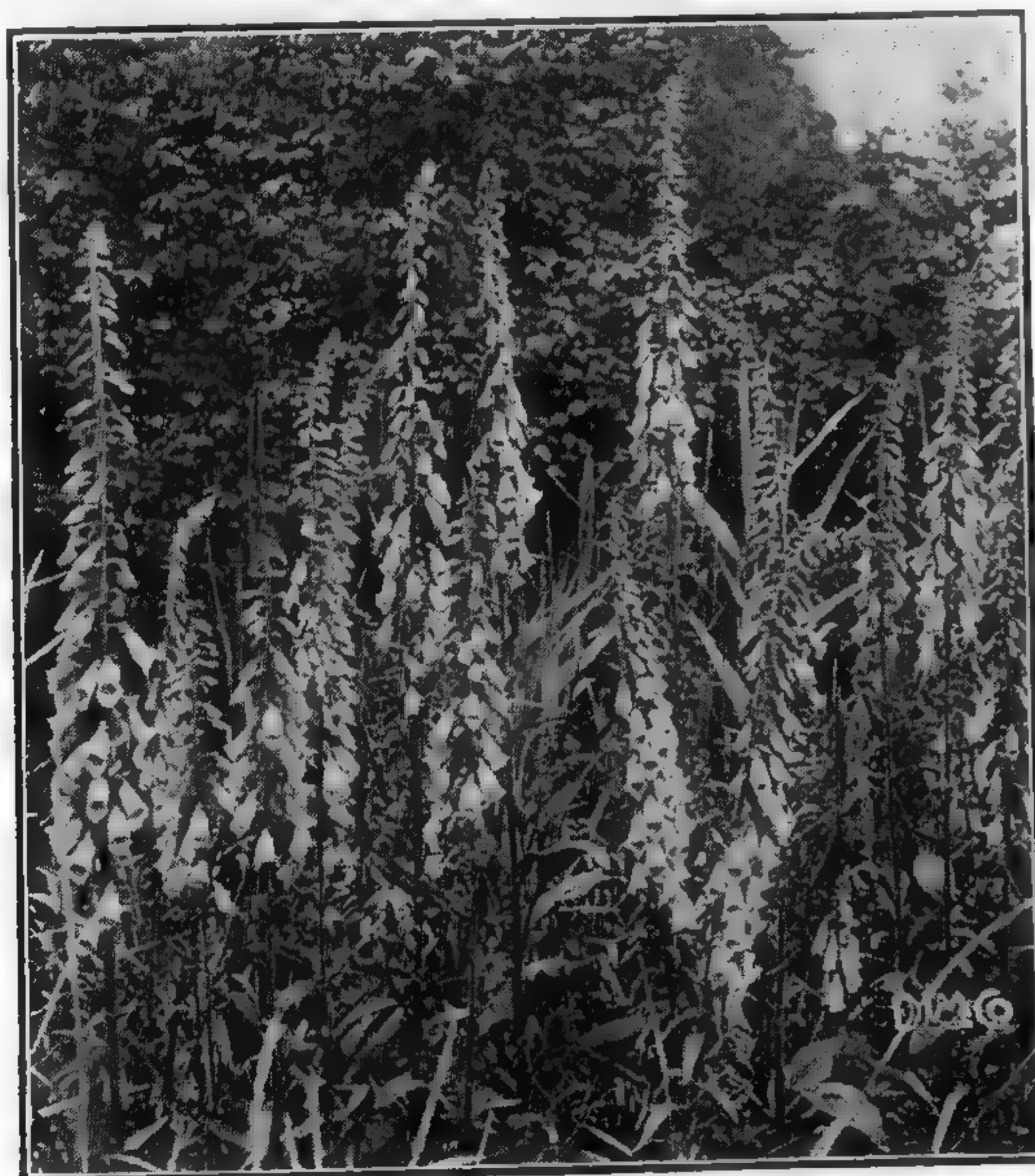
Entire beds, perhaps 5 by 10 ft., of Verbenas, planted 12 in. apart each way, will prove very effective.

A white variety of Drummond's Phlox planted 8 in. apart, with any light bulbs of pink Gladiolus between will look well.

On some narrow strip, where there is little room, try *Godetia Rosamond* with its satiny pink flowers by itself. You will be rewarded by a handsome display. The salmon pink *Sybil Sherwood* is even finer.

A large bed of *Nicotiana alata*, the ornamental Tobacco, near a porch where you can get the great fragrance in the evening, is very satisfactory. The *Nicotiana* self sows and it will be necessary to keep these in check. Some good colored forms of this are available.

In a hot, sunbeaten, dry place, sow the *Portulaca* or Sunplant. The metallic seeds self sow and the plant will come up year after year. This is the old-fashioned "Seven Sisters" plant which some persons fancy bears seven colored blooms on one plant.



Foxgloves (*Digitalis*) are hardy biennials; they seed and reproduce themselves freely—See also page 192

In a corner where you want something out of the ordinary, plant a few seeds of Spiderflower (*Cleome*). The flowers are rosy crimson, and possess long filaments and pistils followed by long, slender seed pods. They are strong, attractive, but a trifle weedy.

Edge a bed of Cannas or other tall plants with Fountain Grass (*Pennisetum*).

To combine with bouquets, grow a little clump of Cloud grass (*Agrostis nebulosa*).

For the Sweet Pea bouquets do not neglect planting some Babysbreath (*Gypsophila elegans*). This will look well grown in a bed with annual Larkspurs or with Stocks. Babysbreath must be planted several times during the season if a continuous supply is needed.

Some persons admire small hedges of Summer-cypress, or *Kochia*, but this plant turns a very bad bluish-crimson color in Autumn—a color which harmonizes with nothing.

When the season does not prove too moist, or when planted upon sandy soils, the dwarf or Cupid Sweet Peas are excellent. They bear rather long stems and very good flowers.

No annual flower blooms for so long a time as the *Petunia*. If the colors can be selected before setting the plants into the bed, the results will be better. It will be unnecessary to combine them with anything else, as they are all-sufficient, and are as useful for beds 2 ft. square as for huge borders 100 ft. long and 4 ft. wide. *Petunias* may be had in many types, small and large flowered, smooth or ruffled, and double as well as single. Seed can now be had giving 100 per cent doubles.

Where a dainty blue edging plant is wanted, use *Swan-river-daisy* (*Brachycome*), placing the plants about 6 in. apart.

If you must neglect your garden, but want a good show of color, try beds of *Zinnias* or *African Marigolds*, especially the new *Guinea Gold*.

If you wonder what to use for edging any bed, decide to use *Sweet Alyssum*; it is a most adaptable border plant. When it appears to be nearly through blooming, cut it back and it will start up again.

EVERLASTING FLOWERS

It is always interesting to grow a few everlasting or Strawflowers. If they are picked in their proper stages, the leaves removed and the blooms hung upside down to dry, they will present a pretty appearance all Winter. The principal annual specimens are:

CATANANCHE CAERULEA (Blue Cupids-dart). Blue and yellow varieties are available. Somewhat resembles Bachelor Buttons.

GOMPHRENA GLOBOSA (Globe-amaranth). The strawlike heads resemble Clover. The two colors are a crimson and a rather muddy white.

HELICHRYSUM BRACTEATUM (Strawflower). One of the largest everlasting flowers. There are many shades of yellow and red. They grow 2 to 3 ft. tall and need to be planted 1 ft. apart if they are to develop properly. They should be picked before they are fully open.

HELIPTERUM HUMBOLDTIANUM (Humboldt Everlasting). Bears a yellow flower, smaller than others but numerous.

HELIPTERUM MANGLESI (Rhodanthe) (Mangels Everlasting). The flowers are pink and white; the stems are very graceful.

HELIPTERUM ROSEUM. Bears dainty white and rosy pink flowers. They should be cut when quite in bud; they open a little after being picked, otherwise the centers are visible and being brown give a shabby appearance to the otherwise attractive flower. It is pretty for the border, aside from its being good for the Winter bouquet.

STATICE SINUATA. Most useful for cutting. Comes in blue, white and pink. *S. bonduelli* is pure yellow. Seed needs to be started early.

XERANTHEMUM ANNUUM (Everlasting or Immortelle). Bears rose, purple, and white flowers. As a garden subject they retain their bloom from early Summer till frost.

ANNUALS FOR CUT FLOWERS

Many of the annuals are useful for cutting because they have long stems, good keeping qualities or excellent colors. They commend

themselves admirably for arrangements in the low bowls which are beginning to be used and are of such great value for a proper loose display of flowers.

ACROCLINIUM (See *Helipterum roseum* in list of Everlasting Flowers).

AFRICAN DAISY (See *Arctotis*).

AMETHYST (See *Browallia*).

ANCHUSA (Bugloss). A striking new annual form is Blue Bird, resembling a Forget-me-not. Upright habit with flowers of purest blue. Much finer than the species *A. capensis*.

ANTIRRHINUM (Snapdragon). This is gaining greatly in its deserved popularity. Almost all the colors are good.

ARCTOTIS GRANDIS (African Daisy). This is a very handsome Daisylike annual, the flowers of which are a bluish white, the under surface being rather bluish gray. The buds open nicely after the flowers are cut.

BABYSBREATH (See *Gypsophila*).

BLANKETFLOWER (See *Gaillardia*).

BROWALLIA DEMISSA (Amethyst). A very graceful little blue or white annual which is prettily used in bouquets.

BUTTERFLYFLOWER (See *Schizanthus*).

CALANDRINIA GRANDIFLORA (Rockpurslane). Fine rose colored flowers. 2 ft.

CALENDULA OFFICINALIS (Pot-marigold). Bear strong, golden orange and lemon colored flowers. They will bloom for a long season if the seed pods are kept off. Many fine new types have lately been introduced.

CANDYTUFT. The varieties are pure white as well as lavender and crimson. They are very useful for all sorts of cut flower purposes.

CENTAUREA CINERARIA. Also known as Dusty-miller.

CENTAUREA CYANUS (Cornflower). Furnishes some of finest blues; also pink and lighter shades. Is an excellent keeper when cut.

CENTAUREA IMPERIALIS and AMERICANA (Sweet Sultan and Basketflower). Dainty rose, light lavender and white thistlelike flowers; long stems; excellent for vases and baskets.

CHINA-ASTER. This is perhaps the very best annual for cutting.

CHRYSANTHEMUMS CARINATUM and SEGETUM. Beautiful large Daisies, both white and yellow, the former having a dark zone around center.

CLARKIA. The double forms of this annual are charming for cutting, especially Salmon Queen, Alba, Brilliant (crimson) and Vesuvius (orange scarlet). The flowers are borne on tall stems. Treat like Godetias. Makes an elegant pot plant for early Spring blooming in a greenhouse.

COREOPSIS TINCTORIA, DRUMMONDI (Coreopsis or Calliopsis). Appears in excellent golden and maroon color combinations. The stems are long and wiry.

CORNFLOWER (See *Centaurea*).

COSMOS. One of best tall annuals, and one of the latest to bloom, is Cosmos. Procure the earliest varieties for Northern planting.

DELPHINIUM (See Larkspur).

DIMORPHOTHECA HYBRIDA (Cape-marigold). Beautiful yellow and white Daisies, the white having a blue zone.

DUSTY-MILLER. Unexcelled for gray effects.

ESCHSCHOLTZIA HYBRIDA (California-poppy). Now to be had in all colors from white to dark bronze.

EUPHORBIA (See under "Lesser Known Annuals").

EVERLASTING (Applied to *Helichrysum*, *Helipterum*, *Xeranthemum* and some others).

FORGET-ME-NOT (*Myosotis*). This dainty blue flower has a greater hold upon our sentimental admiration than almost any flower except the Rose.

FOUNTAIN GRASS (*Pennisetum*). Dainty, hairy spikes.

GAILLARDIA (Blanketflower). Resplendent in shades of orange and scarlet.

GLOBE-AMARANTH (See *Gomphrena*, under "Everlasting Flowers").

GODETIA. Excellent satiny petals and some very good colors appear.

GYPHOPHILA (Babysbreath). Unexcelled for bouquets. The fine, misty, white flowers lend to any decoration a grace which cannot be duplicated by any other annual.



Larkspur (*Delphinium*)

IMMORTELLE (See *Xeranthemum*, under "Everlasting Flowers").

LARKSPUR. Appears in superb pinks, blues, lavenders and has dainty foliage.

LEPTOSYNE MARITIMA. Brilliant yellow Coreopsislike flowers on long stems.

LINARIA MAROCCANA HYBRIDA (Toadflax). A wonderful race of small Snapdragonlike flowers in all colors.

LOVE-LIES-BLEEDING (See *Amaranthus*, under "Foliage Annuals").

LUPINES. Free flowering. There are excellent pink, blue and light yellow varieties.

MARIGOLD, AFRICAN. This flower is rather coarse, but always thrifty.

MIGNONETTE. Is indispensable because of its supreme fragrance. The less beautiful kinds are apt to be the most fragrant.

MYOSOTIS (See Forget-me-not).

NASTURTIIUM. For brilliancy of color, prolificacy of bloom and novelty of form, few flowers can rival the Nasturtium.

NEMESIA STRUMOSA HYBRIDA. Brilliant in garden or for pots. Needs early sowing indoors. Charming for table decoration in all colors.

NIOBELLA DAMASCENA (Love-in-a-mist). Excellent, fine foliage and pretty blue flowers.

PANSY. It must be borne in mind that the Pansy only grows during the cool, early days of Spring or Fall; it must be planted accordingly. Best when sown in August.

PAPAVER RHOEAS (Shirley Poppies). With their silky petalage and good colors, these make good cut flowers if picked when in bud.

PHLOX DRUMMONDI (Drummond Phlox). The real, brilliant, clear colors of this annual Phlox are admirable for small vases.

POPPIES, SHIRLEY (See *Papaver rhoeas*).

REED CANARY GRASS (See *Phalaris*, under "Foliage Annuals").

RHODANTHE (See *Helipterum manglesi*, under "Everlasting Flowers").

SALPIGLOSSIS. Resembles the Petunia, but taller and featuring colors not seen in that family. Striking when well grown.

SCABIOSA (Scabious). Excellent long stems and good colors; lend themselves to pretty vase decorations.

SCHIZANTHUS (Butterflyflower). One of the fairy-looking flowers. Give a little shade in the garden.

SNAPDRAGON (See *Antirrhinum*).

SQUIRRELTAIL GRASS (See *Hordeum*, under "Foliage Annuals").

STOCK, or GILLIFLOWER (*Matthiola*). Old favorites. The newer varieties give a large percentage of doubles.

STRAWFLOWER (See *Helichrysum*, under "Everlasting Flowers").

SUMMER-CYPRESS (See *Kochia*, under "Foliage Annuals").

SWEET PEAS. An ideal annual; see "Contents" for special article.

SWEET-SULTAN (See *Centaurea imperialis*).

TARWEED (See *Madia elegans*, under "Lesser Known Annuals").

VERBENA. Glorious low growing plants that are strictly perennial but not hardy. Sown early in heat, they flower all Summer.

WISHBONE FLOWER (See *Torcnia*, under "Lesser Known Annuals").

YOUTH AND OLD AGE (See *Zinnia*).

ZINNIA (Youth and Old Age). A universally admired flower because of its rich appearance and ease of culture.

LESSER KNOWN ANNUALS

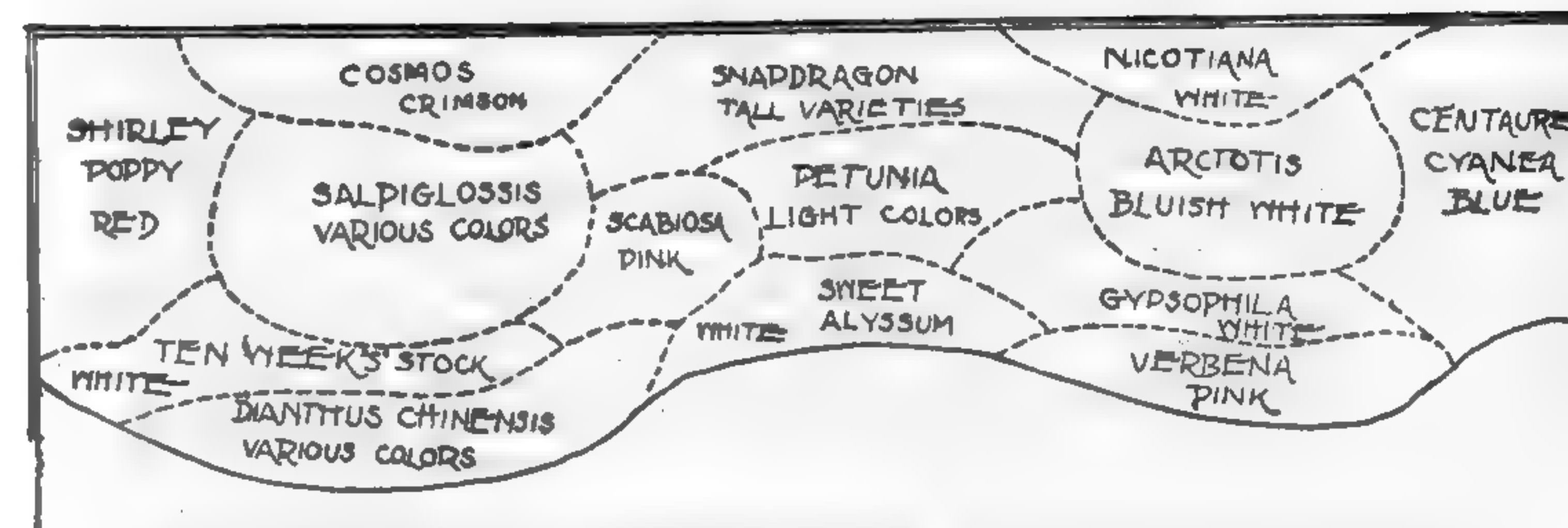
For those who have tried the commonest annuals, a few others of interest should be mentioned. Each year the catalogs list a new introduction from other countries or a unique series of hybrids. These novelties are sometimes excellent, but being expensive and of doubtful value for the changed climates and soils, they should be bought only as experiments and not planted directly into beds in which a good show must be depended upon.

The plants in the following list are not wholly new, but are rarely seen in our gardens. They merit attention.

ALONSOA ACUTIFOLIA. Attractive coral colored flower; compact plants.

ANCHUSA CAPENSIS (Cape Bugloss). Very pretty, minute blue flowers, but tend to go to seed rapidly.

ARGEMONE GRANDIFLORA (Pricklepoppy). Foliage spiny; flowers yellow.



A scheme for a border of annual flowers. This bed is approximately 6 ft. by 20 ft.

BALSAM (*Impatiens balsamina*). Lovely double flowers. Likes heat and moisture.

CACALIA COCCINEA (See *Emilia*).

CERINTHE RETORTA. A unique annual bearing spotted leaves and yellow tubular inverted flowers, tipped with purple.

CLINTONIA PULCHELLA. A lovely blue California annual for edging.

COLLINSIA BICOLOR. An excellent annual for town gardens. The new Salmon Beauty is a decided break from the original purple and white. 12 in.

CYNOGLOSSUM AMABILE (Houndstongue). Resembles a tall Forget-me-not; needs early sowing.

DIASCIA BARBERAE. Bears a rose or orange colored spurred flower.

EMILIA FLAMMEA (*Cacalia coccinea*) (Tasselflower). An intense scarlet. Should be planted at least 4 in. apart. Self sows.

ERYSIMUM PEROVSKIANUM. One of deepest orange colored annuals. Earliest culture.

EUPHORBIA HETEROPHYLLA, or PAINTED SPURGE. Leaves are dark green, except the upper, which are bright red at the base.

GILIA CAPITATA. The light blue flowers are borne in miniature heads.

LAYIA ELEGANS. Pretty dwarf yellow annuals, with flowers about an inch in diameter.

MADIA ELEGANS (Tarweed). Very distinct yellow flowers and glandular heavily scented foliage.

MENTZELIA AUREA. A free flowering, golden yellow, cup-shaped flower. A useful garden annual.

NEMOPHILA INSIGNIS. Excellent pure deep blue.

NICOTIANA AFFINIS (Tobacco). Now in several colors as well as white. Sweet scented especially in evening.

PHACELIA CAMPANULARIA. Bears blue flowers resembling the Canterbury-bells.

SALVIA FARINACEA. Very pretty foliage and almost white flowers.

SANVITALIA PROCUMBENS. A dwarf, compact annual, useful for edging; very prolific of blooms.

STATICE SINUATA (See Everlastings).

TORENIA FOURNIERI (Wishbone Flower). A very pretty blue or white, yellow spotted flower.

URSINIA AENETHOIDES. A new South African vivid orange Daisy with a dark zone.

ANNUALS FOR EDGING BEDS OF OTHER PLANTS

AGERATUM
ANNUAL PHLOX
BABYSBREATH
CALIFORNIA POPPY
CALLIOPSIS (Dwarf)
CANDYTUFT
DWARF SNAPDRAGON

DWARF MARIGOLD (*Tagetes signata pumila*)
FRENCH MARIGOLD
LOBELIA (*Lobelia erinus*)
MADAGASCAR PERIWINKLE (*Vinca rosea*)
NASTURTIUM, TOM THUMB

PETUNIA
PORTULACA
SANVITALIA
SCARLET FLAX
SWAN-RIVER-DAISY
SWEET ALYSSUM
VERBENA

FOLIAGE ANNUALS

AMARANTHUS CAUDATUS (Love-lies-bleeding). Foliage deep maroon often.

ARGEMONE MEXICANA (Pricklepoppy).

HORDEUM JUBATUM (Squirreltail Grass). Spike resembles a squirrel's tail. Adds a very graceful touch to the border or bouquet.

KOCHIA TRICOPHYLLA (Summer-cypress). Makes a formal cypresslike plant. In Autumn turns a bluish crimson, at which time it seems a poor color.

PENNISSETUM (Fountain Grass). Dainty and graceful hairy spikes.

PHALARIS ARUNDINACEA, VAR. PICTA (Reed Canary Grass). A very useful grass for bouquets as well as landscape effect.

RICINUS COMMUNIS (Castor-bean). One of the tallest, most rampant growing annuals.

ZEA MAYS JAPONICA (Striped Maize). Useful for bouquets of Gladiolus or Kniphofias.

BIENNIALS

This is a term used to cover plants that live but two years. The seed is sown in Spring or early Summer, the plants flowering the following year and then dying. As a matter of fact, there are very few true biennials and not more than two or three are known to average gardeners. The rest are either of small value in the garden or are difficult, among the latter being certain Meconopsis and Hunne-



Double Wallflowers in the shelter of a wall

The tall dark red is in the background, the dwarf yellow in front. Except in sheltered situations, Wallflowers are not hardy in the region of New York, frame protection being necessary. Potted in the Fall and kept in an unheated glass porch, they will flower beautifully in early Spring

mannia fumariaefolia. The Brompton and Lothian Stocks are hardy biennials in sections where the Summers are not too hot and dry and the Winters not severe, but in the North they are useless unless they can be given frame protection. Wallflowers likewise need the same protection in cold sections but these are strictly perennials though treated as biennials, even in England where they are exceedingly popular. Papaver nudicaule (Iceland Poppy) is also a perennial and of considerable hardiness if given a little covering, but it is safer to treat them as biennials, raising a new batch every year for many plants are apt to die off during the second Winter after flowering. The hybrid Foxgloves (Digitalis) are perennials in mild sections but in the North should be treated as biennials. Hollyhocks, Anchusa Italica and Sweet-williams (Dianthus barbatus) also are perennials but are prone to rot away the Winter after flowering, depending upon soil conditions and weather. Sweet-williams, however, are so free in producing young basal growths after flowering, that one may readily divide them and keep up healthy, vigorous young stock without further sowings. Various other perennials need frequent propagation by division or cuttings, otherwise they become weakly and die out after a short time.

The only true biennials of real importance are Canterbury-bells (Campanula medium), Cheiranthus allioni (Siberian Wallflower) and hybrid Verbascums of the giant Olympicum type. These *must* be sown in May and transplanted while small if they are to make strong plants to flower the following year. Some may fail to bloom, in which case they will make immense plants and bloom the next year, before dying. Since they retain their foliage during the Winter, they, like all perennials that retain their foliage, should be given a moderate amount of protection in Winter especially where intermittent mild and freezing spells occur. Under deep snow they are hardy but in ordinary sections a light covering of salt hay or other litter should be given when the ground first freezes allowing it to remain until the latter end of March. This covering will shade the plants from sunshine; check heaving through alternate freezing and thawing and protect from biting winds which are apt to do more injury than anything else, especially in March.

For a complete work on the subject of this chapter we recommend

THE BOOK OF ANNUALS, by ALFRED C. HOTTES

Secure this book where you bought your Garden Guide



A most pleasing combination of garden favorites

Chapter XIII

SOME GARDEN FAVORITES AND HOW TO GROW THEM

By T. A. WESTON

Althaeas—Antirrhinum—Aquilegia—Aster—Astilbe—Tuberous Begonia—Campanula—Canna—Chrysanthemum—Cimicifuga—Coleus—Dahlia—Delphinium—Dianthus—Digitalis—Doronicum—Geranium—Gladiolus—Gypsophila—Helenium—Hemerocallis—Heuchera—Hibiscus—Iris—Kniphofia—Lathyrus—Lilium—Lupinus—Papaver—Paeonia—Petunia—Phlox—Pyrethrum—Salvia—Scabiosa—Sweet Pea—Tagetes—Viola—Zinnia

ALTHAEA • Hollyhock

GRAND plants and never happier than when growing near a house wall. In such a position they will stand for years before they need renewing. If allowed to, they will renew themselves, as they seed freely and intermix readily, the seedlings often showing new colors. The best method, however, is to raise a new batch from choice seed every year or two. Seed sown outdoors in May will give flowering plants the following year and be at their best the second year.

ANTIRRHINUM • Snapdragon

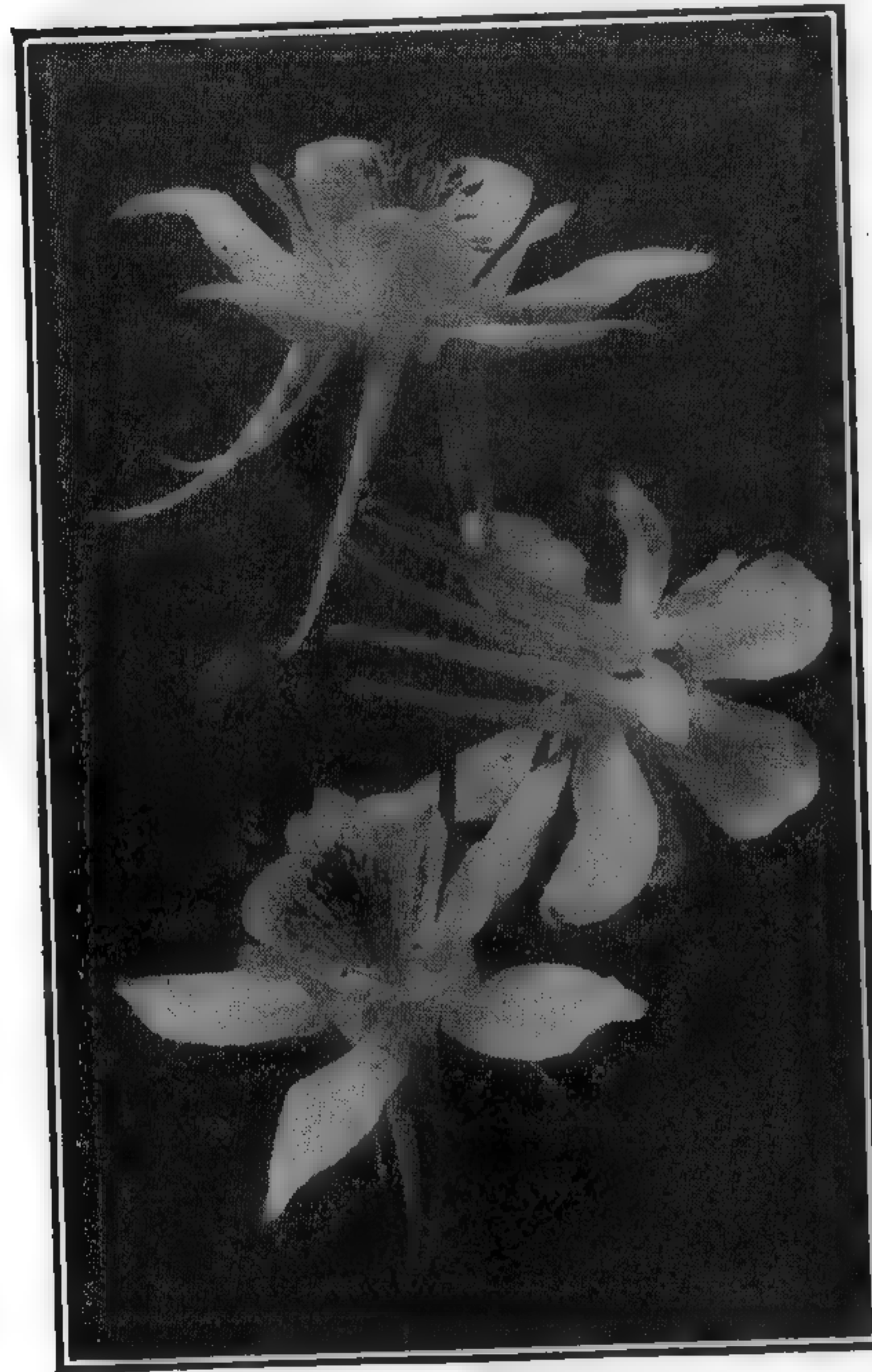
The Snapdragon gets its name because the flower is like a lion's head; if pressed at the sides the mouth opens. Snapdragons are available in such a variety of excellent colors—yellow, orange, red, pink, deep maroon, lavender and white—that they are adaptable for all situations in the garden. There are both tall and dwarfs; the medium height varieties are best for general use.

Snapdragons are of easy culture. The seed is best sown indoors in March or April and the seedlings transplanted. When about three inches tall the top should be pinched out; this causes the plant to branch. Subsequent pinching will also be of value. Cut the spikes freely; it will encourage others to grow. There is a hybrid perennial

type known as Rock hybrids, charming dwarfs that stand the Winter if protected; easily raised from seed.

The plants may be troubled with aphids; if so, spray with nicotine. See chapter on Insect Pests for formula. For rust use sulphur dust.

AQUILEGIA • Columbine



The Columbine

A true perennial that is at its best the second or third year from seed

Columbine is the popular name for this extensive family. The species and hybrids are so numerous and the flowers so varied in color that they are deserving of a prominent place in every garden.

Seed should be sown in a prepared bed or in the coldframe in Spring and the seedlings transplanted where they can develop. They are slow growers, and if not well tended while small, they will not make good blooming plants for the following year.

Some of the most charming forms to grow are the long-spurred hybrids *A. chrysantha*, clear lemon yellow long spurred; *A. canadensis*, the yellow and red wild Columbine of the East; and *A. vulgaris*, a short-spurred form. *A. flabellata nana* is a perfect gem for the rockery, and there are other dwarf species.

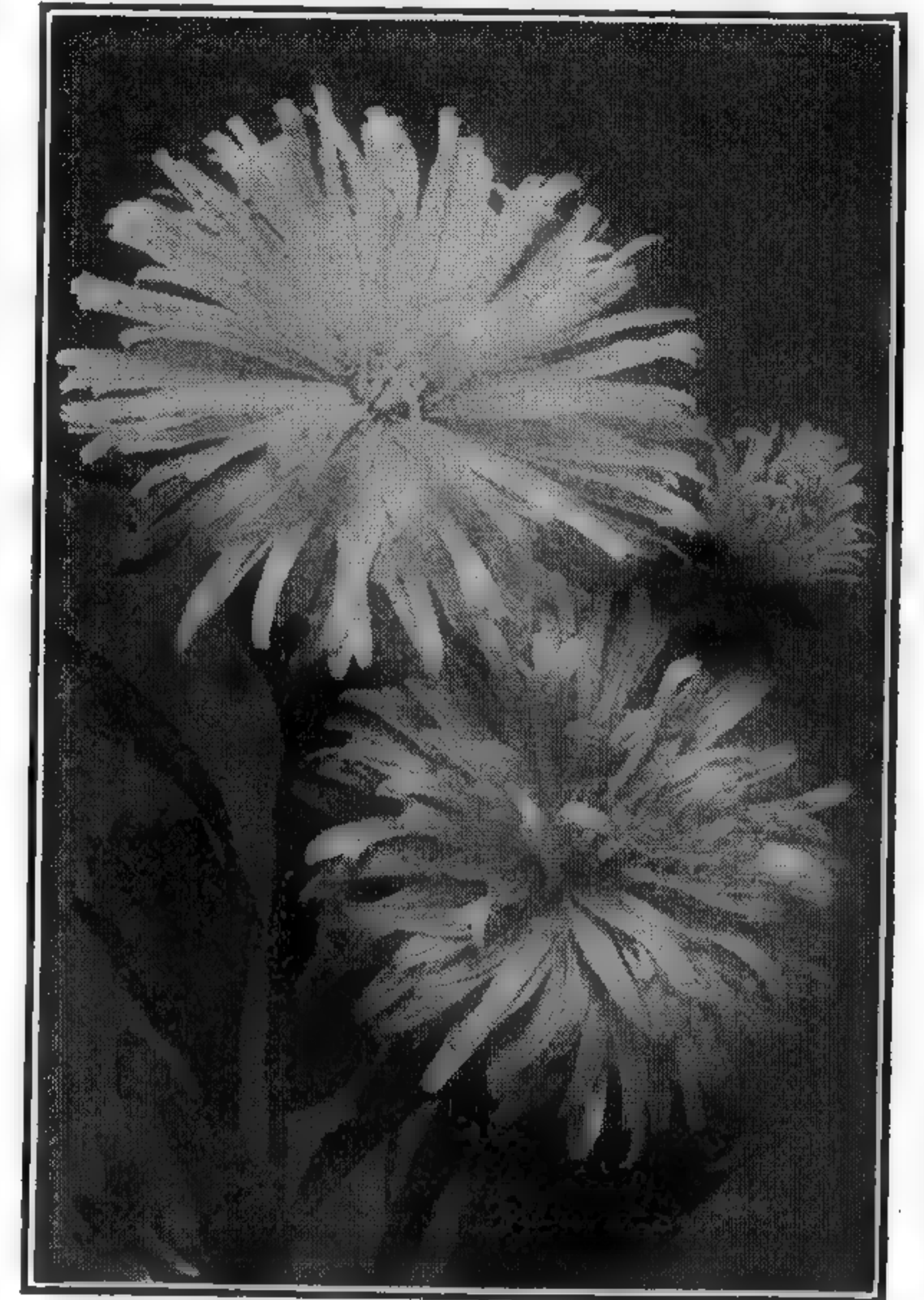
ASTER

Asters as they are recognized today are what have resulted from the development and improvement of the China Aster (*Callistephus*). Real Asters are small, Daisy-like flowers, resembling the single-flowered China Aster and known in England as Michaelmas Daisies.

There are all sorts of types of China Asters, all of which have been improved from one single-flowered sort. They are annuals, easy of

culture, and with their profusion of bloom and color make a brilliant garden display, particularly in the Autumn. The best types to grow are the Branching, with long, strong stems; the Crego, Hohenzollern, and Comet, all of which are flat-flowered; the King, which has long needle-like petals, and the ball-like sorts, as Victorias, Truffaut, and Peony-flowered Perfection. There are early, medium and late kinds. The later flowering sorts are most successful with the home gardener, and the wilt-resistant strains are strongly recommended.

The seeds of the earlier varieties may be started in the hotbed or window in March. For late Summer and Autumn flowers, sowings may be made in the open ground in April or May. Vigorous growth is encouraged by two transplantings. When the seedlings are large enough to handle transfer to flats or beds. Transplant again when the plants are 3 or 4 in. high, setting them where they are to bloom, 12 to 15 in. apart; the branching sorts need more room to develop. Do not let the plants get a check in any way due to want of water, or cramping of root system. A rich, well prepared soil suits them best. Wood ashes or slaked lime incorporated with the soil will do much to prevent root and stem diseases to which Asters are liable. The true Asters, hardy perennials, are most valuable Fall bloomers, ranging from 12 in. to 5 ft. Many named varieties are cataloged. Simply plant and divide the clumps when crowded. All shades of blue; also white and pink.



China "Comet" Asters

To be had in all sorts of types and a multiplicity of colors

ASTILBE

Often called Spireas, this is a superb perennial for the garden. Ranging from white to red, the feathery flowers are most beautiful in June, and they vary from 15 in. to 4 ft. They must have abundance

of moisture and the flowers last longer if partially shaded. The roots should be divided every three years and the soil must be rich.

BEGONIA (Tuberous)

Gigantic and clear colored flowers of wondrous freshness and beauty, are the proper words to describe the Tuberous Begonia.

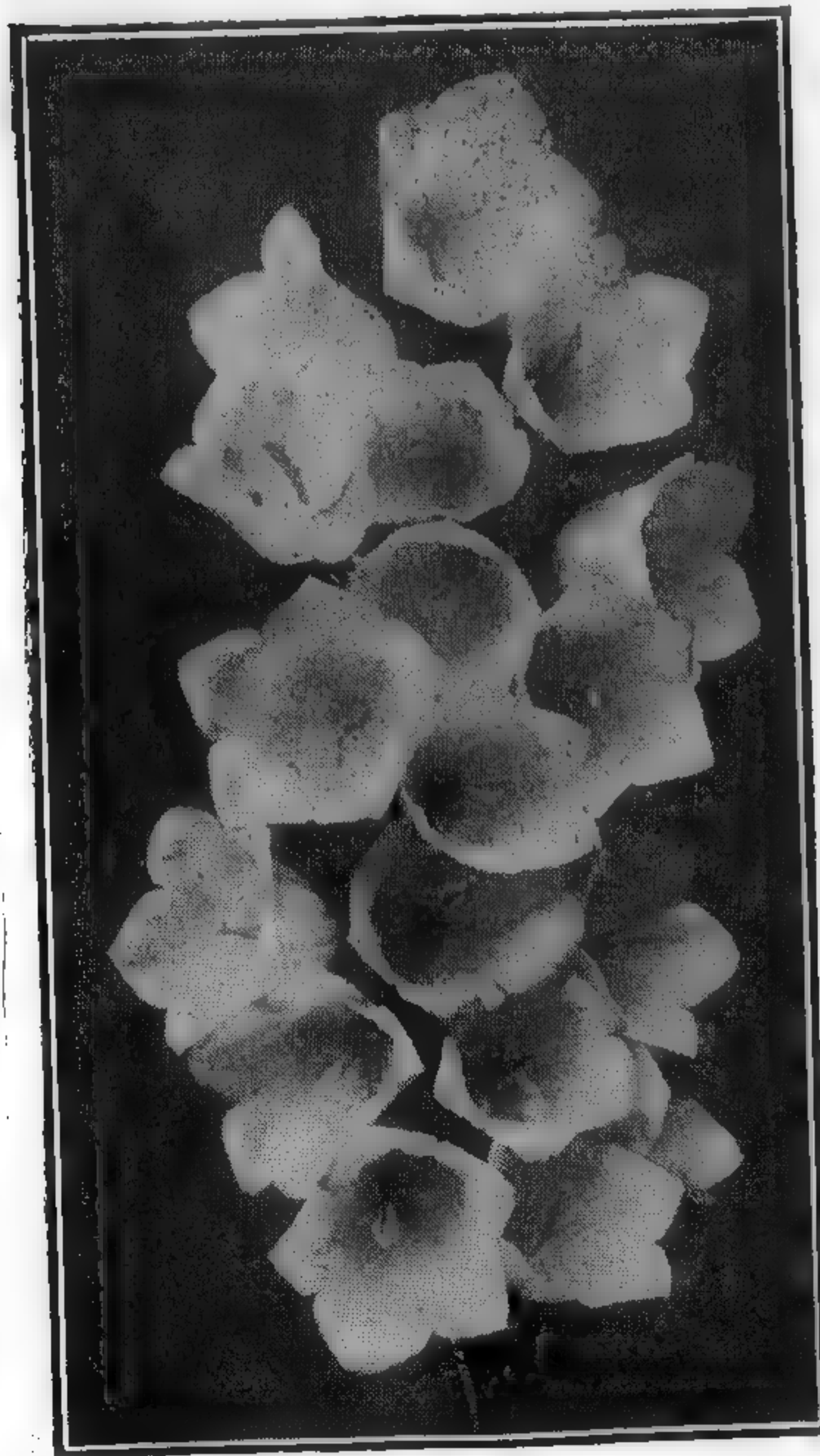
Dormant tubers may be purchased in early Spring and should be started in a box of moss or peat, giving them a high temperature. When leaves are well advanced, pot up or place in a frame to harden, but do not plant outdoors until the end of May. They like the shade; the north side of the house is, therefore, ideal. They must have a loose, highly enriched, moist situation, otherwise they will not be at their best. Planted among Rhododendrons in the leafmold they succeed admirably. Take up the tubers in the Autumn and store through the Winter in sand, giving a temperature of 50 degs. Where a greenhouse and bottom heat are available, tuberous Begonias may be

flowered in a few months from seed, but skill is needed as the seed is about the smallest to be found in any plant.

CAMPANULA • Bellflower

The Bellflowers have ever been popular; the form of the bell appeals to everybody. All round the world these Campanulas have been christened with names which show the admiration of the folks for them.

The number of species under cultivation is great. None is more popular than the Canterbury-bells (*C. medium*) and form known as Cup-and-saucer (*C. m. calycanthema*) from its having saucers beneath the flaring chalices. Bearing smaller flowers and less cup-like is the graceful Peachleaf Campanula (*C. persicifolia*), named from



Campanula persicifolia

its narrow leaves. There is also the stately Chimney (*C. pyramidalis*), the tallest growing sort.

There are two smaller growing sorts, the Carpathian Harebell (*C. carpatica*) and the Rocky Mountain Harebell (*C. rotundifolia*), but there are scores of other species and varieties, ranging from 3 ft. to 3 in., the dwarf sorts being for the rock garden.

Canterbury-bells are biennials, dying after flowering. Sow seed in the Spring and transplant a few inches apart to grow on and plant out in the Fall, either where they are to remain permanently, or in coldframes until Spring. If outdoors, protect during the Winter with leaves or stable litter, but avoid covering heavily.

CANNA

This handsome subject marks a wonderful development by the plant breeder. At first Cannas were only prized as foliage plants; the petals were narrow and the flower was very unattractive. Now we have an excellent series of wonderful Cannas with superbly colored gigantic flowers, all of which are of easy culture and great value for the garden, where they are planted in formal beds or mixed in the perennial border.

STARTING CANNAS

In March, the roots which have been stored during the Winter are best cut up so that there are one to three buds or eyes in each piece. They can then be planted in boxes of sand or sandy soil and placed in a light window. If the season is late and the plants get rather large, they should be placed in pots; those four inches high are generally large enough.

Cannas are tender and should not be planted in the open ground before all danger of frost is past. There is no advantage in planting too early, for they do not make good growth till the ground becomes thoroughly warm.

PREPARING THE CANNA BED

Spread a wheelbarrow load of well rotted manure over each square yard of soil and dig deeply; the soil should be loosened to a depth of 15 to 18 in. The deeper the digging the better will the bed absorb water. Large-leaved plants always require lots of water. Careful attention must be given to the question of the planting of varieties of harmonious colors as well as of the proper heights. We give herewith a list of select varieties:

Eureka, white, 4½ ft. high. Mrs. Pierre S. Dupont, deep pink, 4 ft. City of Portland, pink, 3½ ft. King Humbert, red, 4½ to 5 ft. Antoine Wintzer, scarlet, 4 ft. Mrs. Herbert Hoover, deep red, 4 ft. Mary Thilow, salmon, 4 ft. The President, red, 5 ft. Favorite, yellow and variegated, 4½ ft. Yellow King Humbert, red spots, 4½ ft. San Diego, orange, dark foliage, 4 ft.

A supplementary list of equally fine varieties contains the following: Wyoming, reddish bronze leaves and ochre colored flowers, tall and good; Richard Wallace, soft creamy primrose trusses and green foliage—effective and desirable, compact habit; Venus, deep pink flowers, dark green foliage, sturdy grower; Souv. d' Antoine Crozy, brilliant scarlet and gold, flowers large, a free bloomer and dwarf; J. D. Eisele, rich orange scarlet, 5 ft., one of the very best. *Rosea gigantea*, has immense flowers of a deep old rose color; one of the finest and most beautiful; Mrs. Alfred Conard, salmon pink, large and fine; Sungold, orange suffused scarlet, 4½ ft. Mrs. Antoine Wintzer, pure yellow, 3½ ft. Many others of prime excellence though earlier introductions, are to be found in some catalogs, but the leading firms largely confine their offerings to the foregoing, and for general purposes they are amply sufficient. For the sake of its handsome



On a lawn, backed by trees, a bed of Cannas makes an imposing show

shining green foliage, and its general stateliness, *Canna gigantea* is recommended. It is very handsome next to the walls of one's house.

Cannas spread a little and, as they are strong growers, they should be planted at least 18 in. apart. The Orchid-flowering varieties require from 20 to 22 in. between the plants. In planting, firm the roots well and cover with 4 to 5 in. of soil.

CANNAS FROM SEED

Raising Cannas from seed is interesting, especially if one aims to develop improved forms by crossing choice varieties. The prospects of getting anything unusual are remote, however, but some good types are certain, even from bought seed. If started early, seedlings can be flowered the first year.

Because of the extreme hardness of the shells, *Canna* seeds should be soaked a few days before planting. The seeds are also frequently nicked with a file or sharp knife. Sow half an inch deep in a sandy loam in a box or pot and place in a hotbed or some other warm location. When large enough to handle pot off singly and keep under glass until the open beds are ready to receive them.

DIGGING AND STORING

When the tops are killed by the frost the roots can be dug in the morning, and if the day is sunny they can be left to dry. They must be stored where they can be kept warm, for if they are cold and damp they decay. They may either be buried in sand or soil, although sand is preferable. If a greenhouse is available the roots may be stored under the benches. It is really unnecessary to wait until the tops die down, for the beds may be wanted to plant with bulbs, in which case let the Cannas grow as long as possible and then dig them.

CHRYSANTHEMUM

The word *Chrysanthemum* has been derived from the Greek *chrysos*, gold, and *anthemon*, flower. Many of our popular plants are really *Chrysanthemums*. The Wild Ox-Eye Daisy, the Shasta Daisy, the *Pyrethrum* (from which insect powder is made), the Feverfew of our grandmother's garden, the Marguerite or Paris Daisy of the florist, as well as the monster decorative blooms of the expert culturist indoors, are all *Chrysanthemums*.

Some of the Chrysanthemums, or 'Mums, as the gardener affectionately calls them, are annuals. The majority of the annual species have flowers resembling large Daisies. They are white or some shade of yellow, and often have a maroon or red ring of color at the center. The annual types can be sown in April, in the open ground, where they should be thinned to 8 in., or, if large plants are wanted, pinch them back when several leaves tall, and place 12 in. apart. A rich, sandy loam suits them best and they love the sun but need lots of moisture. They bloom profusely throughout the Summer and early Fall. The species known as Golden Feather (*Chrysanthemum praealtum* var. *aureum*) should be sown indoors in March and though really a perennial it is treated as an annual. It is useful as a



A cluster of Hardy Chrysanthemums
Propagated by cuttings or by division of the root
and also of great interest to grow from seed

yellow-leaved border plant.

An excellent characteristic of the perennial Chrysanthemums is that they usually spread by means of suckers or underground stems. The Feverfew (*Chrysanthemum parthenium*) is a very old plant and it bears small, tufted white and yellow flowers in clusters. Flowering early in the Summer, the stems are useful for cutting and mixing with other flowers. The white Daisy-like species is even more valuable. Known as the Shasta Daisy (*Chrysanthemum maximum*), this is a giant form of the white field Daisy of very vigorous growth and producing

flowers from June throughout the Summer. They have very good keeping qualities and are effective in the border or as a cut flower. Another species, a shrubby Daisy (*Chrysanthemum nipponicum*), blooms in the Fall and produces its flowers on the stems from the old shoots of the previous year. An excellent October flowering species also is *C. coreanum*, resembling Marguerites.

The class known as the Hardy Chrysanthemums and which resemble the indoor varieties, are of two types, the button-like varieties or pompons, and the Aster-like or large-flowering varieties. Most of the varieties are hardy if protected in the Winter by dry leaves. They enjoy constant cultivation and a rich soil which has been deeply prepared. They are best planted in the Spring and old plants should be divided up and reset each year. Good seed is now available of this type, and they may be grown successfully by this method, but named varieties are preferable.

If young single stemmed plants are set out in May or June, pinch out the tops where they have grown 8 in. tall. This will cause them to branch freely. From the very start in growth the plants must be staked. The shoots can easily be tied regularly when the stakes are once in place. If large flowers rather than quantity of bloom are wanted, feed with liquid manure when buds begin to show, and remove many of the smaller buds on each stem. A canvas covering is rather desirable for very late varieties when in bloom, as a sharp frost is apt to ruin them. However, there are lots of named sorts that normally flower by mid-October, the color range being quite extensive.

CIMICIFUGA - Snakeroot

Beautiful hardy plants, loving rich soil, plenty of moisture and partial shade. Growing 4 ft. to 6 ft., the long, feathery white spikes are most decorative. The native *C. racemosa* flowers in August, the Japanese *C. simplex* in October, the latter being less tall. There are several dwarf species.

COLEUS

For grouping on lawns, ribboning and bedding the Coleus is one of the most useful and attractive of ornamental plants. It is a tender subject and grows from a foot to two feet high, and the colors and variegations of its foliage are rich and beautiful. Sow the seed indoors in March or April in good mellow soil, covering lightly; maintain an even temperature; do not allow the soil to become dry. Plant out in late May or June, preferably in a sheltered situation.

By judicious pinching out of the tips of the shoots the plants can be maintained at any desired height. Unless one has a suitable place for raising seedlings early, young plants bought of the florist will give more satisfaction. These are raised from cuttings and therefore of definite colorings.

DAHLIA

There is no cause to wonder why the Dahlia has gained in popularity. The newer varieties win our admiration as soon as we see them. Should you insist that the Dahlia is very formal and stiff, we should answer that the ones to which you refer are perhaps stiff because they were carefully bred for regularity and symmetry, and you would look upon them as triumphs of the breeder's art if you knew that the modern varieties have been evolved from several wild Mexican species. Near Mexico City, at an altitude of one thousand to two thousand feet above that of the city, we find the wild forms on the sides of the deep ravines in partial shade. It is hot in the daytime, but really gets cold at night.

It was at the end of the eighteenth century before the Dahlia reached Europe, and shortly after three varieties were known. Doubles were then produced and the flat flowers were first very popular; later

the ball-shaped blossoms of the show type became the rage.

Between 1830 and 1860 the interest in Dahlias became intense, and great premiums were paid for good varieties. Then in 1870 followed varieties which were flatter, less formal and delicately colored. In 1872 a new species, Dahlia Jaurezi, was introduced. This is the progenitor of the Cactus Dahlias, a type universally admired at present because of its graceful form and delicate coloring. The Cactus types combined with the singles, produced the Peony-flowered forms. In 1899 a pretty type was produced in France, the single flowers having a ring of small petals around the central disk. This type is known as the Collarette Dahlia. The major types today are giant Decoratives and



Duplex form of Dahlia

The Dahlia is essentially the poor man's flower and most nobly does it respond, in its innumerable types, to its really trivial needs

Semi-cactus. Specially grown, some sorts will bear flowers 12 in. or more across. The stems of all modern Dahlias are much stronger than formerly, making them effective for garden and cutting.

CULTIVATION

The Dahlia is typically Fall blooming and succeeds in any location where killing frosts do not come too early. Planted in May, the general run of varieties will flower successfully in all parts of New York State, New England the Central West. The soils best adapted to Dahlias are those which are somewhat sandy, but they will grow on heavy clay. The regions which are influenced more or less by the ocean; that is, where cool nights are prevalent, are perhaps the most noted for Dahlia growing, especially Long Island, New Jersey, Rhode Island, Maryland and Massachusetts in the East, and without a doubt the best Dahlias we have ever seen were in British Columbia, Northern California, Washington and Oregon. Heavy soils may be lightened by coal ashes, sand, and coarse manure. Sandy and lighter soils will benefit by manure or clay to make them more moisture-retaining. Nitrogenous fertilizers are rarely applied, because they encourage too great vegetative growth and a retarding of the flowering period.

TIME AND DISTANCE OF PLANTING

It is not necessary to start the roots before planting unless one has a hotbed and intends to propagate from cuttings (see Contents, Plant Propagation). If stood in a cool cellar, the roots will start sprouting in April or May and one can then divide them so that each division has one or two shoots.

They may be planted in May, according to the season. It is better to set them out late than too early. As the Dahlia makes a large plant it should be given plenty of room; even 4 ft. by 4 ft. is not too much if the variety is vigorous. Planted much closer the plants are difficult to tend. The tubers should be placed about four inches deep, planting them flat or in such a position that the growing point is faced up toward the surface of the soil. Firm the roots well.

SUPPORTING

The average root will make several shoots. Allow them to grow until they make the first set of leaves; by that time the strongest can

be selected and the others cut away below the surface of the soil. Sometimes two shoots may be allowed to grow, but never more; as a rule one shoot is sufficient. Tie the shoot to a stake when about a foot high and do not neglect tying as the plant develops, for the plants are very brittle. To cause the plants to branch, pinch out the top when the plants are about 12 in. tall; this causes lateral shoots to start.

FOR ATTAINING LARGE FLOWERS

If the soil is carefully and diligently cultivated there will be little need for watering, which is detrimental unless consistently practiced. Thorough watering should be given each time and at regular intervals; otherwise plants will be checked and flowers will suffer.

In order that each individual flower may be as large as possible, especially in the case of the show and fancy types, which produce a great many flowers of medium size, it is best to disbud the main branches, leaving only the terminal bud; exhibition plants should not have more than six or eight branches. The singles, collarettes and pompons are rarely pruned or disbudded, the idea being to get plants with as many flowers as possible. The cactus varieties are apt to have their weak neck habit intensified by excessive pruning and disbudding, so that they should be cautiously disbudded, removing only part of the buds.

Flowers are best cut in the morning or evening and any foliage not wanted should be removed. The stems should then be placed in deep vases filled with water and removed to a cool place. Hard-stemmed varieties should have the base of the stems dipped in hot water and then be placed in fresh cold water. Under no circumstances attempt to ship for exhibition without pre-cooling.

When the Autumn killing frosts arrive, perhaps in mid-October, and the foliage is killed, take up the plants at once and allow them to dry a little in the sun. Cut off the stems so that a stub of 3 in. is left. Then place them in a cellar where temperature will surely remain above freezing, about 40 to 45 deg. F. They may best be placed with the stems down on shelves and covered with soil or sand. When storing large tubers it may not be necessary to cover them; merely place them in a heap on shelf or floor, keeping the stems to outside. Do not let them get dried out; if they shrivel, sprinkle a little water over them. If kept too moist they will soon mildew.

RAISING DAHLIAS FROM SEED

This is fascinating work, particularly the dwarf single forms. If the seed is sown in a frame or greenhouse in March, the plants will come into bloom in July; they will also flower if the seed is sown outdoors in May, the same as most of the annuals. The seed of the double Dahlias should be sown in February or March, and the plants grown on the same as if from cuttings. With good care they will come into flower early in September, when the pleasure commences. The certainty of getting something good and the possibility of getting a flower worthy a name, possibly better than any of the existing forms or varieties, makes this branch of floriculture of extreme interest.

The young seedlings should be set close together, not more than 2 ft. apart; when they come into flower, weed out such as are not desirable to keep. Another reason for close planting is that except for the single varieties, the plants do not attain in their first season as large growth as if from tubers.

DELPHINIUM · Larkspur

The charming and immensely popular Delphinium, which is better known, perhaps, by its common name, Larkspur, is well adapted for beds and borders. There are both perennial and annual sorts. For variety and beauty of blossoms, few other plants can equal the perennial Delphiniums, especially the improved English or hybrid kinds. Growing to a height of from 3 to 6 ft., they bear on their erect stems long, graceful spikes of magnificent flowers, ranging in color from pure white through all shades of blue, while the clean, curiously cut foliage shows off to advantage. If the stems are cut off close to the ground when the flowers begin to wither, second, even third crops will follow, and the season of blooming is thus prolonged until late Fall.

Delphiniums are easily cultivated. They succeed best in deeply dug, loamy soil, enriched with fine manure, but any well-fertilized soil will give good results. Seed sown in the hotbed or indoors in February will produce plants which should begin to bloom in the garden from July on. When seed is sown in the open ground flowers may not come until the second season. As soon as the weather is favorable for transplanting, set the young plants from 2 to 2½ ft. apart in the bed. Apply a little bonemeal to the soil around the plants during the Summer, and in very dry weather give them a



Sturdy Delphiniums of this character are not usually possible until the second or third year

copious supply of water. Covering the crowns with coal ashes when Winter sets in will protect them from insects. Among the good varieties are: Belladonna, turquoise blue; Chinense, gentian blue; Formosum, deep blue with white center; Moerheimi, pure white. The giant hybrids, single and double, can be had either mixed or to name, though the latter do not come dependably true from seed.

The annual Larkspurs bear spikes of handsome flowers and their fine colors are strikingly effective in the bed or shrubbery border. They grow 2 to 3 ft. high and in a sunny situation bloom all Summer. Seed should be sown in the open ground in April.

DIANTHUS · Pink and Sweet-william

The hardy Pinks rank with the time honored gems of the old-fashioned garden. Splendidly adapted for beds and borders, they deserve a place in every garden, not only on account of their great beauty and free blooming qualities, but also for their usefulness as

cut flowers. Throughout the Summer months they yield a profusion of single and double blooms which for brilliancy and variety of contrasting tints are unsurpassed; many of them are delightfully fragrant. They grow from 4 in. to 18 in. and the taller sorts are excellent for cutting. The varieties classed as annuals include the well-known Chinese Pink (*D. chinensis*), the Heddewig Pink (*D. hedde-wigi*), and the Diadem Pink (*D. diadematus*); while among the hardy perennial sorts the old-time popular Grass Pink (*D. plumarius*) still stands out as one of the handsomest, and an excellent subject for massing in the bed and ornamenting the border.

There is also a race of perpetual blooming hardy Pinks, known as Allwoodi, both dwarf and tall. They are easily raised from seed. The best annual varieties with double flowers furnish a blaze of color throughout the Summer. They love sunshine.

Perennial Pinks are propagated by cuttings or divisions made during early Summer. Seed may be sown under glass in early Spring, or directly in the garden as soon as the frost has gone. Select a sunny situation.

Old-time gardens always provided a place of honor for the well-known Sweet-william (*Dianthus barbatus*), and among flower lovers of the present day they are also held in high esteem. They are easily grown in any good soil and their trusses of bloom of bright and varied colors produce a beautiful effect. The Sweet-william is truly a perennial, but good results are obtained when it is treated as a biennial. It flowers the second year from seed. Young rooted divisions may also be secured in the Fall, these quickly making strong plants.



Hardy Pinks
Splendidly adapted for bed and borders



Given partial shade under trees, Foxgloves can be depended upon to make a bold showing

DIGITALIS • Foxglove

For garden and shrubbery borders the dignified and stately Foxglove has always been a great favorite. It is also extensively planted for naturalizing along the edges of woods and in other suitable places, where it self-seeds and flourishes. Rising to a height of three to five feet from masses of broad, dark green foliage, the robust stalks produce long spikes of beautiful tubular flowers, which give a highly ornamental effect to any garden. The colors are bright and varied, most of the strains being prettily spotted or blotched. Some of the newer introductions rival Gloxinias in shadings and markings.

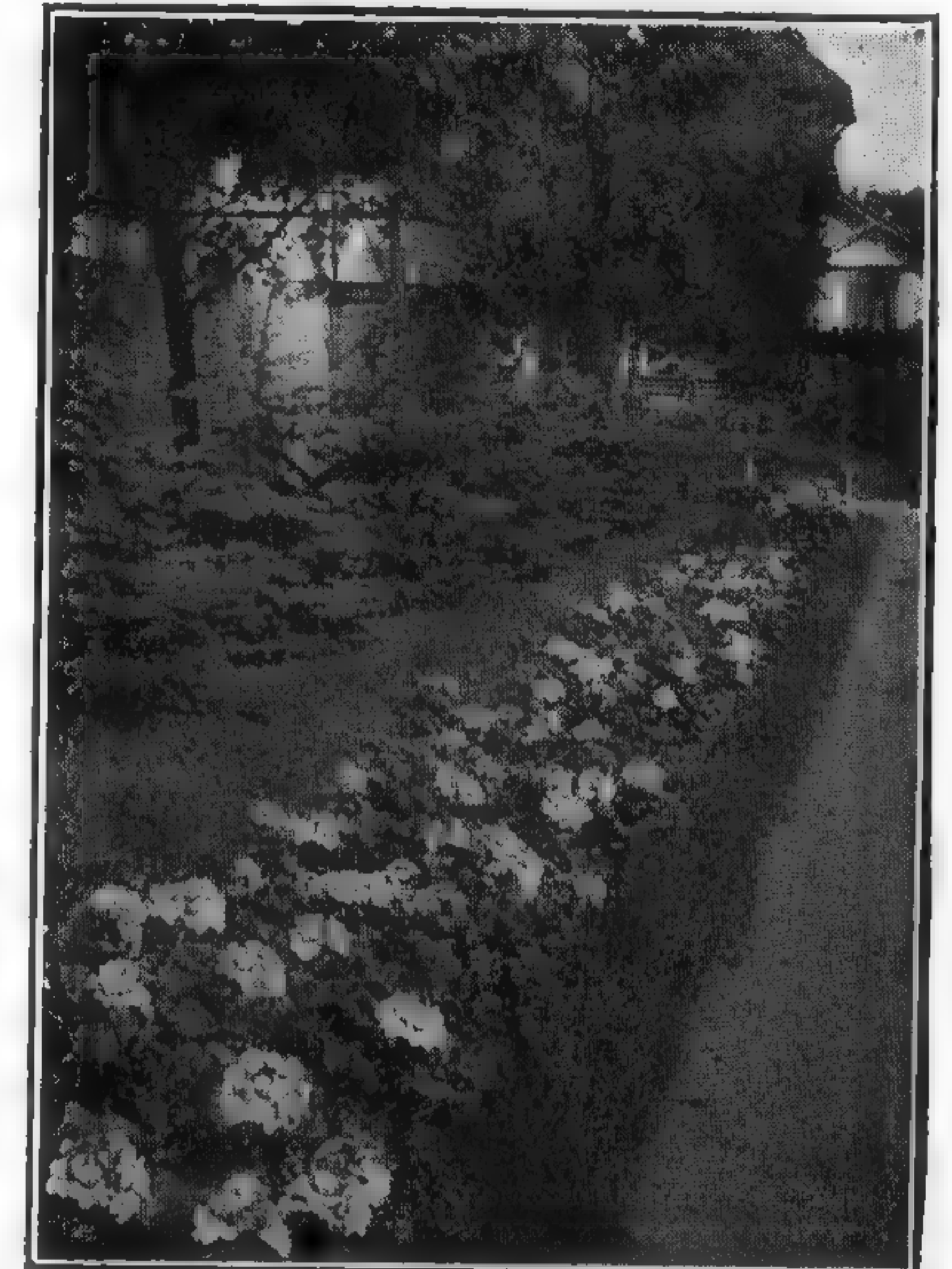
The Foxglove does well in any good garden soil, preferring shady situations. Sow the seed outdoors in Spring and transplant the seedlings where they are to remain permanently, or into a coldframe, where they make extra strong plants for a second transfer. The newer hybrids are really perennial in mild climates, while *D. ambigua*, a small yellow, is a true hardy perennial and does not require sowing every year to ensure a display.

DORONICUM • Leopardbane

A beautiful yellow Daisy-like flower and one of the earliest of all perennials, blooming in early May. One of the easiest things to grow, yet little known.

GERANIUM

An ideal plant for pots and bedding, the Geranium has always been a great favorite in both house and garden, and well deserves its commanding place among the most attractive and satisfactory of old-fashioned flowers. In every section of the country it is popular as a bedding plant and its magnificent trusses of single, semi-double or double flowers, surmounting a wealth of bright green, healthy foliage, furnish a decorative feature which never fails to gain the highest admiration. If not given too rich a soil, Geraniums are profuse and continuous bloomers, the colors comprising pure white, rose, salmon pink, scarlet and crimson. For window



The Geranium well deserves its commanding place among the most satisfactory of old-fashioned flowers

boxes the Geranium can hold its own against all comers, the Ivy leaf types being especially fine for hanging over the front. Being tender, the plants need a greenhouse or a suitable room in Winter; but old plants are rarely worth keeping, save for providing cuttings for propagation in the Spring. The best time to take cuttings is in late August or September and they may be successfully struck in a frame, using pure loam mixed with sand and lightly pressed into small pots well drained with potsherds. Side shoots which have not flowered, cut close to the stem, are considered the best cuttings. They should not be placed in the pots before the wound has dried. Take indoors before frost and keep in a cool frost-free room and give no more water than is essential during the Winter.

If large specimens are desired, pot up the old plants before frost,

cut back a little and carry through the Winter like other tender pot plants.

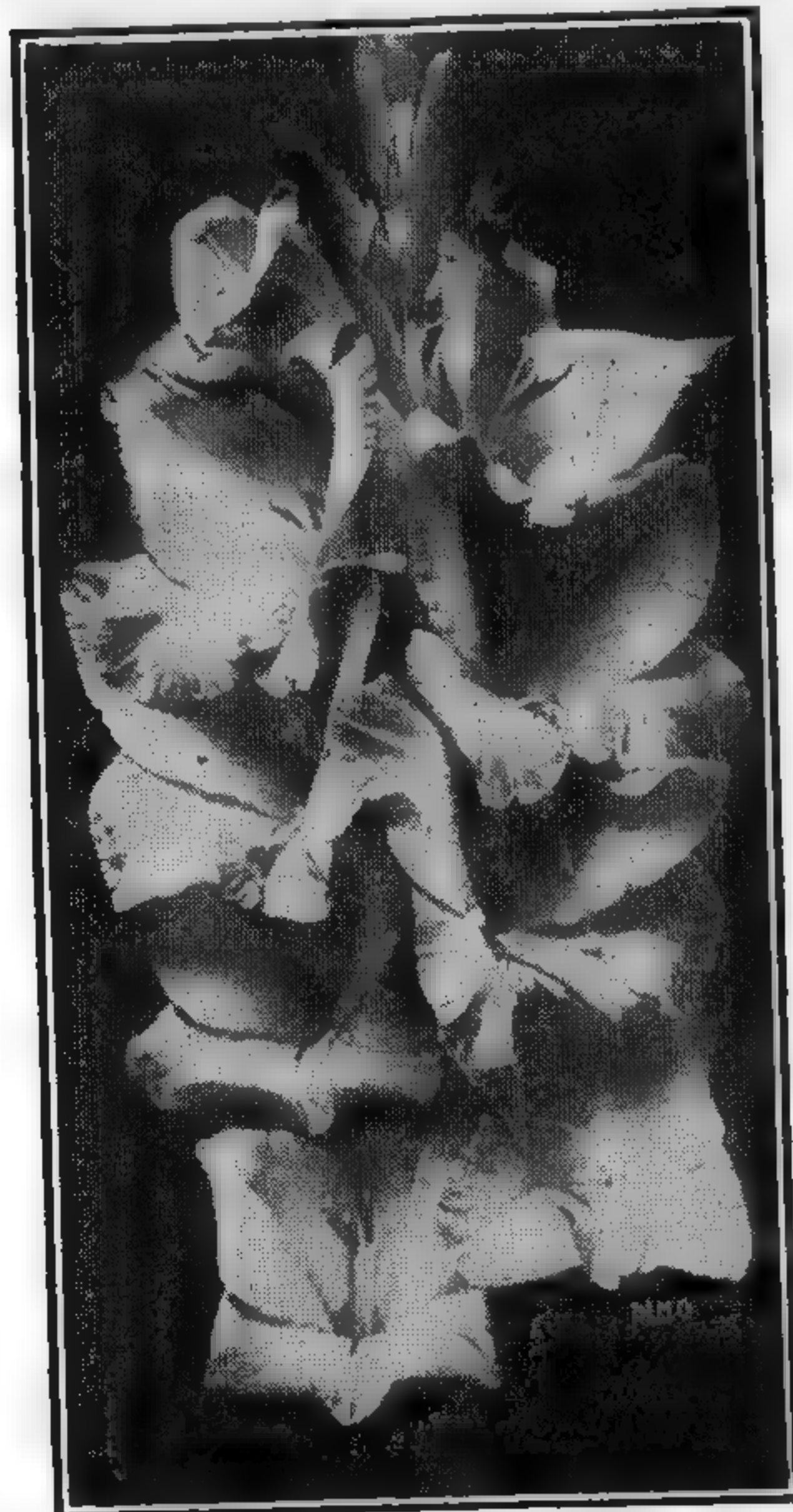
Nipping off the top buds will induce symmetrical and bushy growth. Planting may be done as soon as the weather has become warm and settled.

Among the best varieties are S. A. Nutt, scarlet; Beaute Poitevine, orange rose; Mrs. Lawrence, salmon pink; Mme. Jaulin, peach pink; Mrs. E. G. Hill, orange and white; La Favorite, double white; Alphonse Ricard, orange scarlet; Jean Oberle, soft flesh color with pink center; Mme. Buchner, snow white; and Dina Sclarandis, blush.

GLADIOLUS

Here we have a regal flower stately enough for the finest mansion, as well as a democratic flower charming for the cottage window and home garden. Each year finds new uses for the Gladiolus, which now holds first place among the Summer blooming bulbs. First, because of the great range of color; secondly, because of wonderful keeping qualities, each spike keeping over a week; thirdly, because of its easy cultivation, primarily the same as that for Potatoes; and, fourthly, by the proper choice of established varieties they can be commended because of their cheapness. This flower is extensively utilized for all kinds of decorative work. Large vases or baskets of the stately flower spikes fill a place quite distinct from any other flower. As a garden subject, the Gladiolus is unexcelled for furnishing a long season of bloom, extending from mid-July until frost, either in a bed, in which case the plants should be very close, or in clumps in the herbaceous border.

The best soil for the Gladiolus is a medium loam. It appreciates good fertility, but seems sensitive to any manure in contact with the bulbs. Manure is good if applied in the Autumn previous to planting. The best fertilizer for general use is one that would be called



There should be given space in every garden for a planting of Gladiolus

a Potato fertilizer, rich in potash and phosphoric acid, both chemicals being useful in the proper formation of good bulbs. Bonemeal is also extensively used. Liquid manure, when the buds are forming, seems beneficial.

Gladiolus are not hardy, except some varieties of Lemoinei, and even these require protection in New York State. The first planting should be made in mid-April in New York State and farther south. A well-planned succession in planting is advisable, the last about the end of June. The depth to plant is determined by the character of the soil. In the lightest soil 7 or 8 in. is not too deep, but in a heavy clay 4 or 5 in. would be sufficient. There are two reasons why the bulbs should be planted as deep as the character of the soil will permit: First, the Gladiolus is moisture-loving, and in deep planting its roots are in the cooler moist soil; secondly, the soil acts as a support, no other support for the stems being necessary ordinarily. The bulbs, strictly corms, may be planted in clumps of six in the border or in beds 6 in. apart, or on the commercial plan in rows 18 in. apart and 4 in. to 6 in. apart in the rows. Thrips are the most serious of Gladiolus pests. Continuous spraying with Paris green one tablespoonful, brown sugar 2 lbs., water 8 gals., is the best means of control.

The corms should be dug about mid-October, whether they have died back or not. Cut the stems to within 3 in. of the corms and lay out in boxes or on the cellar floor to dry. Clean off old roots and tops a few weeks later and store in bags or boxes. The best storage temperature is from 40 to 45 deg., with a dry atmosphere.

PROPAGATION

(1) By seeds. By this method new varieties are obtained, but the standard varieties, being hybrids, do not come true when started from seed. (2) By cormels, or "spawn" (the small, hard-shelled little cormels borne upon the old ones). These should be soaked in water for two days and planted like Peas in rows. (3) By the annual renewal of corms which are produced above the old corm each year.

GYPSOPHILA • Babysbreath

The perennial species, paniculata, especially the double variety Bristol Fairy, is essential for cutting. Grows well in ordinary soil and needs no attention. Makes clumps 4 ft. or more across and never fails to bloom.

HELENIUM · Helensflower

Tall, late Summer flowering hardy perennials, these produce large heads of yellow or bronzy red, daisy-like flowers when they are most welcome. Valuable in the border and excellent for cutting. Of easiest culture, they, like Michaelmas-daisies, are at their best when divided every Spring. Several named varieties are offered, which are much finer than the species.

HEMEROCALLIS · Daylily

There are now many fine named varieties of these old-fashioned plants which are almost tuberous rooted. The newer sorts are as large as many Lilies and their season extends from June to late September. Happy anywhere if given sufficient moisture and only need dividing when overcrowded. Some of the newer hybrids show zones of red on yellow while extremely dwarf types have been evolved as well as varieties that carry their flowers on 4 ft. stems.

HEUCHERA · Coralbells

Absolutely essential in the border or rock garden. Extremely hardy and free blooming, the foliage being ornamental and low growing. The red Sanguinea blooms over a long season, starting in May. There are many named forms and good types of hybrids can be flowered from seed in two years. The wiry flower stems range from 18 in. to 30 in. tall, the tiny clusters of bells being delightful for mixing with other flowers. The old plants should be divided every three years, otherwise the stems become woody and few flowers are produced.

HIBISCUS · Rosemallow

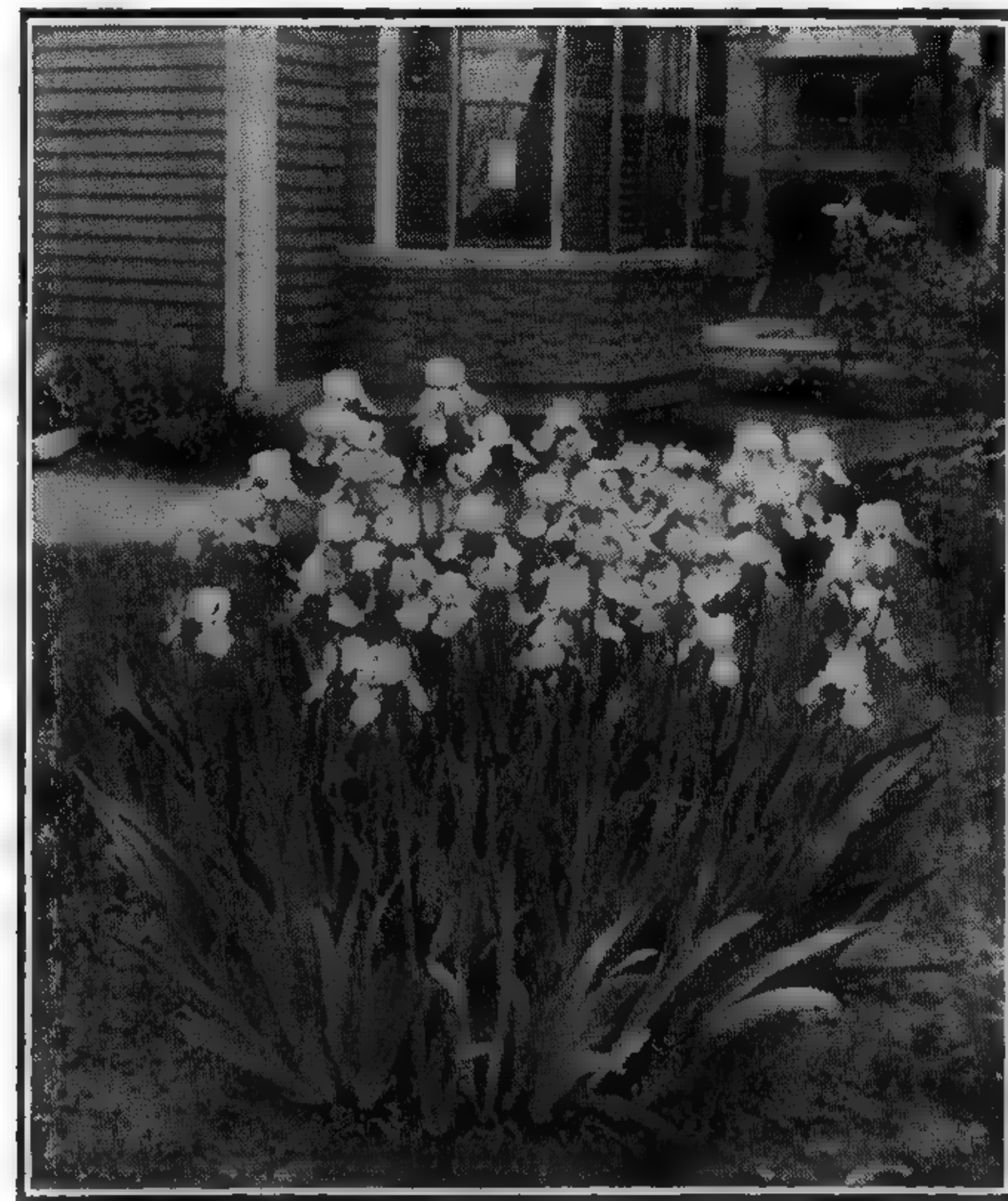
Blooming in August and September, the Hibiscus is one of the hardiest of garden perennials and as it attains almost the dimensions of a shrub it is especially effective when planted along the shrubby borders. The plants are very vigorous, with ample foliage, and produce immense single flowers, ranging in colors from pure white with deep pink eye to bright crimson. They are easily raised from seed and are rapid growers and free bloomers.

IRIS

Could the real beauty of the coloring of the Iris be expressed in words, such a description would be a masterpiece. The word "Iris" has come from the Greek for rainbow. It is the colors of the rainbow we deal with in growing Iris. When the form of the Iris bloom is considered we realize that it is both dainty and elegant and surpassed by few other flowers. The fragrance of many varieties is delightful, vying with that of any Rose. The adaptability of Irises to conditions, such as excessive moisture, continued drought, extended freezing and extreme heat, is remarkable. The rapid reproduction of most varieties is an important point also. Because of all of these favorable attributes we commend the various forms of this incomparable flower.

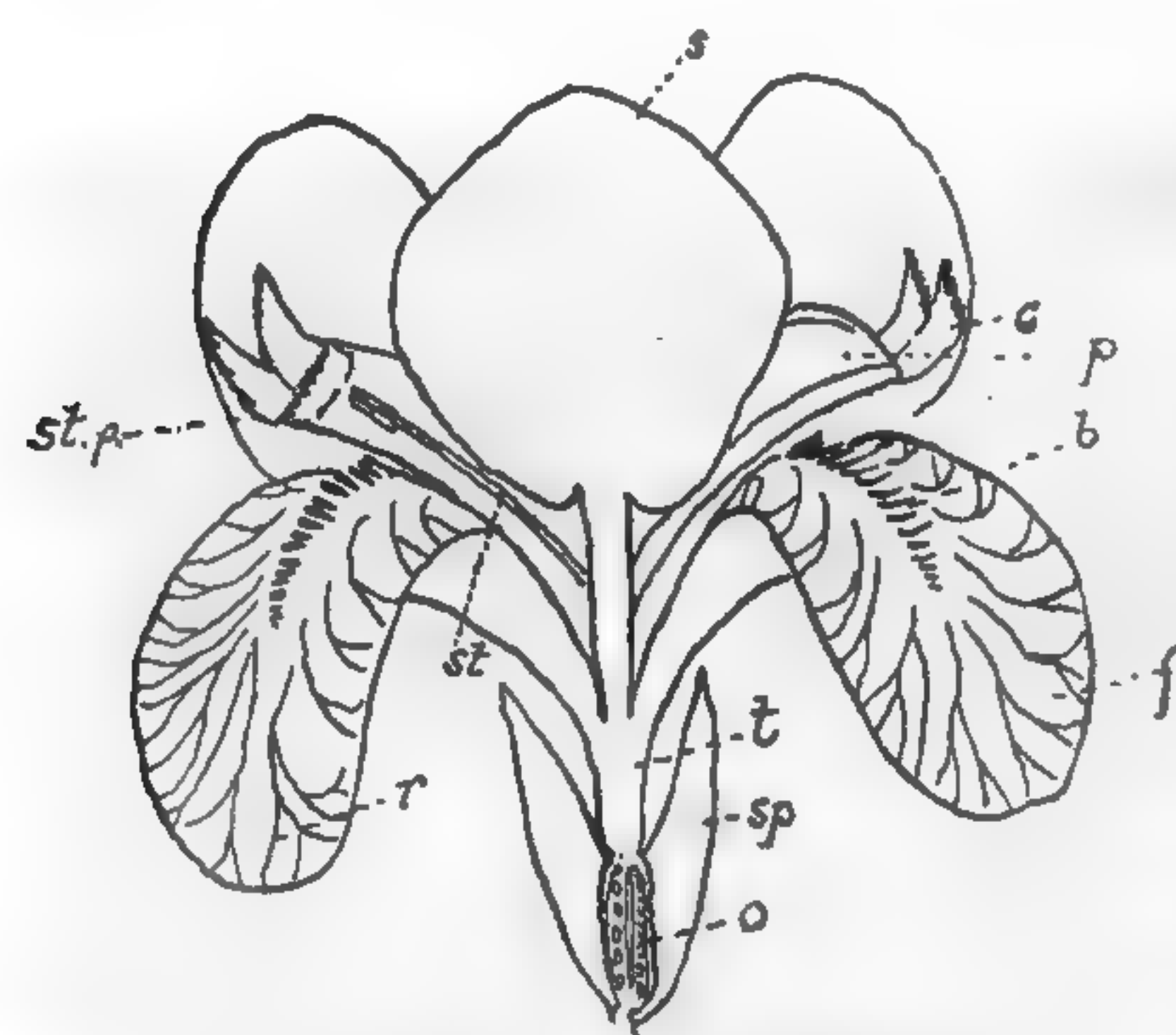
We shall mention only the types of easiest growth. They will be sufficient until one realizes the true range of excellence which is found in the roll of about two hundred species, apart from varieties of which there are hundreds. Later you will perhaps want to grow the California Irises and even the Oncocyclis Iris; no amount of labor will be too much if a new variety can only be made to bloom.

To appreciate the Iris one should have a little idea of what its parts are. The flower consists normally of three petals which stand upright, and three which droop more or less; these are well named, respectively, the standards and the falls. Inside of the standards are noticed three petal-like parts; these are actually lobes of the pistil, the female parts of the flower; it is a most peculiar formation, especially when we know that the little fringed pocket at the apex



Year after year these Irises give prodigal returns for minimum care

The roots should be divided every three years, six or eight of the strongest rhizomes being planted to make a good clump



Typical German Iris Bloom

s, standard; p, pistil; c, crest of pistil; st. p, stigmatic pocket; st, stamen; f, fall; t, tube; sp, spathe valve; o, ovary; r, reticulation; b, beard

of each is really the stigma or part which receives the pollen. The two-forked tip of the pistil is called the crest. Just beneath the pistil is a stamen, the male part of the flower. If we look at a German Iris we will find a very heavy beard on the base of the fall, while the Japanese and Siberian Irises do not have this tuft of hairs. In some Irises the standards are very small, often smaller than the crests of the pistil. Many times the standards, though large, do not stand upright at all.

There is a notion that Irises are all water loving; this is not true. Two Irises only can be planted in the water; these are the common Blue Flag (*Iris versicolor*), our little wild Iris, and the yellow European Iris (*Iris pseudacorus*). These two Irises may well be used in water gardens, but they will succeed perfectly in ordinary garden soil. The wild Iris is hardly as beautiful as some of the others that might be grown, but the yellow European Iris has luxuriant foliage and large, clear yellow flowers, and deserves wider popularity.

The Japanese Iris (*I. kaempferi*) and the Siberian Iris (*I. sibirica*) thrive very nicely at the edges of pools; they will not grow with their crowns submerged, however. The flower of the Japanese Iris differs from the others in being flat, the standards not being upright. There are several forms of the flower; some have six petals and others, because the standards are much abbreviated, are called three-petaled Iris. The flowers are very large. They enjoy rich ground and a constant stirring of the soil, which should never bake over the roots. The Japanese Iris likes to be flooded when in bloom, but at no other time. They bloom later than the other sorts and varieties can be selected which bloom from mid-June till nearly the end of July.

The Siberian Iris, with its blue or white flowers and grass-like foliage is indeed a beautiful garden subject. The spikes are also effective in vase arrangements. The white variety, Snow Queen, with its golden blotch on the falls, is excellent, as are also the intense blue

orientalis varieties. Both the Japanese and the Siberian Iris may be grown in the ordinary border, but plenty of moisture should be given in dry weather. There are several good named varieties of Siberian Irises, while the varieties of Japanese Iris is legion, most of them of Japanese origin.

Perhaps no group is so easily grown as the bearded or so-called German Iris. They are very hardy and stand all sorts of adverse conditions, growing in the parched soil under the eaves of houses, thriving where children tramp the soil to the hardness of a cement pavement, blooming under trees choked by grass, and still give flowers as pretty as an orchid. They should always be planted quite on the surface of the soil, not deeply, and are best placed in bold groups. So rapid is the multiplication that a single crown (rhizome) of a fine variety usually develops several flowering crowns by the following season. The dwarf and intermediate varieties of this type are known as *Pumila* hybrids. The tall varieties were crossed with the dwarf Iris *pumila*, resulting in the Intermediate or Interregna varieties. The blooms are large and most exquisite in color. The range of colors in the tall types is extraordinary, varying from pure white to deepest yellow, purple and violet and including delicate lavender, blue and even ap-



Iris border backed with shrubs in a semi-wild garden

proaching pink. The *Pumila* varieties are the earliest to bloom, usually from early May on. They are followed by the Intermediate and tall varieties, which carry on through June. Aside from the *Pumila* varieties, there are many even dwarfer Iris species, the most notable being *I. cristata*, pale blue, and *I. gracilipes*, bright blue. Both are splendid for the rock garden.

It is interesting to know that *Iris florentina*, the old-fashioned sweet, early blooming, pale, lavender-white species, is the orris-root of commerce and believed to be the original of the *Fleur-de-lis*, or French national floral emblem. The belles of ancient Greece grew it both for flowers and root, and the growing of this root is a leading industry of northern Italy. The rhizomes are dug in the Summer and peeled to remove the outer bark. The separate joints are laid aside to dry until the end of two years, when they will have acquired a delicate fragrance of Violets. The root pieces, which have a white appearance, are brought to the market by perfumers who powder



The wonderful Japanese Iris (*I. laevigata*, or *I. kaempferi*), colonized While enjoying a moist, open situation this Iris does well in a variety of soils and positions

them for dentifrices or sachet powders, or when distilled with water form the oil of orris, the basis of many perfumes.

Almost all Irises like the sun. The best fertilizers for them are wood ashes and bonemeal. The German Iris likes lime; the Japanese Iris like a peaty soil or plenty of leafmold. Most Irises are sensitive to active manure.

Most Irises are best transplanted after blooming, especially the rhizomatic German class, say in August or September. When Iris clumps begin to choke themselves out, usually in three or four years, they should be broken up and replanted, preferably in a new position, or at least, if put in the same situation, give the soil a thorough digging. This does not apply to the bulbous Irises, many of which are hardy and planted in the Fall. In well drained soils the bulbous Irises may remain undisturbed for years.

KNIPHOFIA or TRITOMA

Among hardy perennial plants the Kniphofia, with Red-hot-poker, Flameflower and Torchlily as common names, occupies a prominent place in the Autumn Garden, where it is exceedingly effective grown in single clumps or mingled with shrubbery. It throws up spikes 2 to 4 ft. long, each bearing a compact cluster of dazzling scarlet or orange-red flowers, which present a most unique and picturesque appearance. The plants are very sturdy and remain in bloom after most other flowers have faded away. Raised from seed sown early in heat, they may be expected to bloom the first year, but if immediate results are desired, the purchase of strong roots is recommended. The variety *Pfitzeri* is especially good. Protection in Winter is essential for the roots in all Northern gardens.



The Tritoma
It throws up spikes 2 to 4 ft. long of dazzling scarlet or orange red

LATHYRUS · Perennial Pea

The *Lathyrus latifolius*, or Perennial Pea, is a native of England, where it is extremely popular. Considering its great value as a decorative climber, it is not as extensively cultivated in this country as it should be. To all who love a flower garden it can be recommended as a most desirable plant. It is very hardy, thrives in common garden soil, and the vigorous, leafy vines, which attain a height of 6 to 8 ft., rapidly cover the trellis, wall or stump against which they may be growing. The plants have a fairly long season of blooming; the



Lathyrus latifolius, The Pearl
A beautiful white variety that comes fairly true from seed. Once planted it seems to live forever

flowers, resembling Sweet Peas, are freely produced in clusters, the colors including white, bright pink, rose and crimson; they are very showy and fine for cutting.

Roots can be bought from the nurseryman in March or early in April, to be planted immediately. Seeds sown in April will bloom the following year. A deep, cool soil; that is, one that does not dry out readily in Summer nor get fiery hot, is best adapted. A moderately sheltered or slightly shaded place is recommended. Given a deep, fertile, moist, but not water-logged soil, these Perennial Peas will flourish year in and year out. A mulching with barnyard manure is good

in Summer, or applications of weak liquid manure. Two that deserve special attention are the Pearl, white; *rotundifolius*, with carmine flowers. White Pearl does not come wholly true from seed, but from a batch of seedlings exceptional forms can usually be selected. The true variety when well grown has flowers 2 in. across.

LILIUM · Lily

Everyone who has a pretty garden, some time, sooner or later, takes up the growing of Lilies. They are the charm of the border wherever they are planted. Success with Lilies is not difficult if one gives them the simple treatment they require. Some kinds are difficult and demand careful preparation of soils and individual study, but quite a number can be grown successfully in any one location. The Tiger Lily seems to grow as easily as most weeds and is not even choked by them. Most Lilies prefer good soil, usually light and enriched heavily with peat and leafmold. Manure should not be used except as a mulch. But only on very heavy, poorly drained soil is it necessary to make holes 18 or more inches deep, placing stones at the base and fitting in with special soil. In average gardens working in some peat or leafmold and covering the bulbs with sand is sufficient. A good thick layer of leaves or leafmold is always beneficial as a Winter mulch unless there is a growing ground cover. In some regions the young shoots are frequently injured by Spring frosts; a few evergreen boughs will serve for protection. For the landscape Lilies are easily combined with shrubbery or the herbaceous border, where they are perfectly at home. The wild yellow or Canada, the Turkscap and the yellow speciosum or Henryi succeed admirably in beds of Rhododendrons; especially when the Rhododendrons do not crowd them too much. The Goldband Lily should be planted among shrubs so that the roots are continually shaded, and where a fair degree of moisture is maintained. The Coral and the Thunbergian Lilies are excellent planted among ferns, which furnish an excellent landscape effect besides. The Madonna grows nicely by itself and is most useful for clumps under pergolas or as an edging for walks.

The following are species which should succeed with a little care in many gardens:

CANADA LILY. (See *Lilium canadense*.)

CHALCEDONIAN LILY. (See *Lilium chalcedonicum*.)

CORAL LILY. (See *Lilium tenuifolium*.)

GOLDBAND LILY. (See *Lilium auratum*.)

HANSON LILY. (See *Lilium hansonii*.)

HANDSOME LILY. (See *Lilium speciosum*.)

HENRY LILY. (See *Lilium henryi*.)

LILIUM AMABILIS. A wonderful new red Lily easily raised from seed. Two to 3 ft. and not at all difficult. Plant 4 in. deep.

LILIUM AURATUM (Goldband Lily). White, spotted brownish red and with a yellow band on each petal; 3 to 25 flowers on each stalk; flowers often a foot across; July to August; 4 to 8 ft. One of the largest, but it is very capricious and may

last only a year or two. Does well in Rhododendron beds, but it must not be crowded. Plant 8 to 10 in. deep. Mulch with very well decayed manure. Likes the sandier or the more peaty soils.

LILIAM CANADENSE (Canada Lily, or Wild Yellow). Light orange, spotted brown; flowers drooping; July; 3 ft.; very hardy. Prefers moist soil. Will thrive under garden conditions. Plant 3 in. deep.

LILIAM CANDIDUM (Madonna Lily). White, yellow anthers; June-July; 4 ft.; hardy. Thrives well in ordinary gardens. Dislikes being moved. Transplant in August. Leaf growth takes place in September. Excellent garden subject. Superb combined with Delphinium or Aconitum. Cover with 2 in. of soil only, however large the bulbs.

LILIAM CHALCEDONICUM (Chalcedonian Lily). Bright red; small; July; 3 ft. Does not flower well first season after being transplanted. Do not transplant later than October. Ordinary garden loam, good drainage. Plant 4 in. deep. Not always easy to establish.

LILIAM ELEGANS (Thunbergian Lily). Red and orange; erect; May to July; only a foot or two tall. Likes full sunshine, and plant as deep as 6 to 8 in. Thrives in garden soil but prefers peat, light loam and leafmold. Closely resembles *L. dauricum* and *L. croceum*, but the latter is taller.

LILIAM HANSONI (Hanson Lily). A grand early yellow Lily. Very vigorous and thrives anywhere. Flowers in late June. Four to 6 ft. tall. Apt to get frosted, as it is one of the earliest to start. Plant 6 in. deep.

LILIAM HENRYI (Yellow Speciosum, or Henry Lily). Deep salmon orange; August to September; 6 to 12 ft.; very vigorous; excellent for border; very hardy. Give lots of water at blooming time. Any good soil. Plant 8 to 10 in. deep. A rapid multiplier.



Lilium candidum, the earliest white Lily, and happy almost anywhere. Its greatest enemy is the botrytis disease, apt to be prevalent in damp weather. Spray with Bordeaux mixture as a protection.

LILIAM MARTAGON (Martagon Lily). Both purple and white, but the hybrids of Backhouse (Martagon x Hanson) include many yellow shades. Lovers of woodland soil, these are excellent for gardens, flowering in July. Three to 4 ft. Plant 4 or 5 in. deep.

LILIAM PARDALINUM. The best of the Western Lilies. Resembles *L. superbum*. The variety giganteum grows up to 8 ft. Likes a fairly moist position. Plant 6 in. deep.

LILIAM PHILADELPHICUM (Orangecup Lily). Scarlet, yellow center, dotted maroon; erect flowers; July to August; 18 in.; very hardy; sun or shade; good loam. Best specimens found in wild; often hard to cultivate. Plant 3 in. deep.

LILIAM REGALE (Regal Lily). White, slightly suffused pink, and canary yellow at center; fragrant; hardy and vigorous. Thrives in any garden soil and unquestionably the most popular Lily in cultivation. Three to 5 ft. tall. Plant 8 in. deep. A rapid multiplier and flowers in two years from seed.

LILIAM SPECIOSUM (Handsome Lily). Pink, white, red varieties, spotted crimson; petals very reflexed; rubrum is most common variety; August; 2 to 3 ft. Does well in either sun or shade. Likes a sandy loam best, deep and rich. Succeeds admirably when planted among other perennials which shade the soil. Plant 4 in. deep.

LILIAM SUPERBUM (Turkscap Lily). Orange, flushed scarlet, spotted brown; 10 to 30 flowers on a stem; July to August; 6 to 8 ft.; hardy. Good for border if soil is rather rich and moist. Excellent among low, shrubby growth. Plant 4 in. deep.

LILIAM TENUIFOLIUM (Coral Lily). Deep scarlet; strong, recurved; six to ten flowers on stem; leaves fine; June to July. Up to 3 ft. Good in the border and especially valuable for the rock garden. Plant 3 or 4 in. deep. Easily raised from seed, flowering in two years.

LILIAM TRIGINUM (Tiger Lily). Orange red, spotted purple; large; petals reflexed; July to August; 6 ft.; very hardy. Thrives in any soil; prefers sandy or peaty loam. Plant 5 to 6 in. deep. Stake or plant against wall to protect against winds.

LILIAM WILLMOTTIAE (Willmott Lily). A tall growing Lily bearing up to 40 scarlet, spotted flowers. As easy as the Tiger Lily and a rapid multiplier. Will flower from seed in two years when 18 in. tall and steadily gain until it reaches its maximum of 6 or 7 ft. Should be in every garden.

MADONNA LILY. (See *Lilium candidum*.)

MARTAGON LILY. (See *Lilium martagon*.)

ORANGECUP LILY. (See *Lilium philadelphicum*.)

REGAL LILY. (See *Lilium regale*.)

THUNBERGIAN LILY. (See *Lilium elegans*.)

TIGER LILY. (See *Lilium tigrinum*.)

TURKSCAP LILY. (See *Lilium superbum*.)

WILLMOTT LILY. (See *Lilium willmottiae*.)

YELLOW SPECIOSUM. (See *Lilium henryi*.)

LUPINUS • Lupines

The hybrid Polyphyllus types raised since the Great War by the English breeders have enriched our gardens with a wonderful race of plants, with colors rivalling those of the rainbow. They like a little shade during the hottest part of the day, but in the cooler sections they are happy almost everywhere and they seem impartial as to soil, though in some quarters they do not succeed. In the northern

sections they produce massive spikes, but everyone should make an effort to grow them as they are fine companions for the Delphinium. Easily raised from seed, but not in their prime until established two years. Inoculation of the seed with Lupin bacteria is recommended.

PAPAVER · Poppy

The Poppy should be given a place in every garden, it is so graceful and delicate and beautiful. The Shirley Poppy is rightly considered one of the finest annuals. There is nothing more fairy-like than a bed of these grand single Poppies, with their long, slender stems surmounted by silken blooms of the most charming tints. As cut flowers in the house they are most attractive and will last for several days if gathered before expanding. There are many more splendid strains of annual Poppies, notably the double Peony-flowered, the fringed varieties and the dainty Californian, which is not a true Poppy but an *Eschscholtzia*.

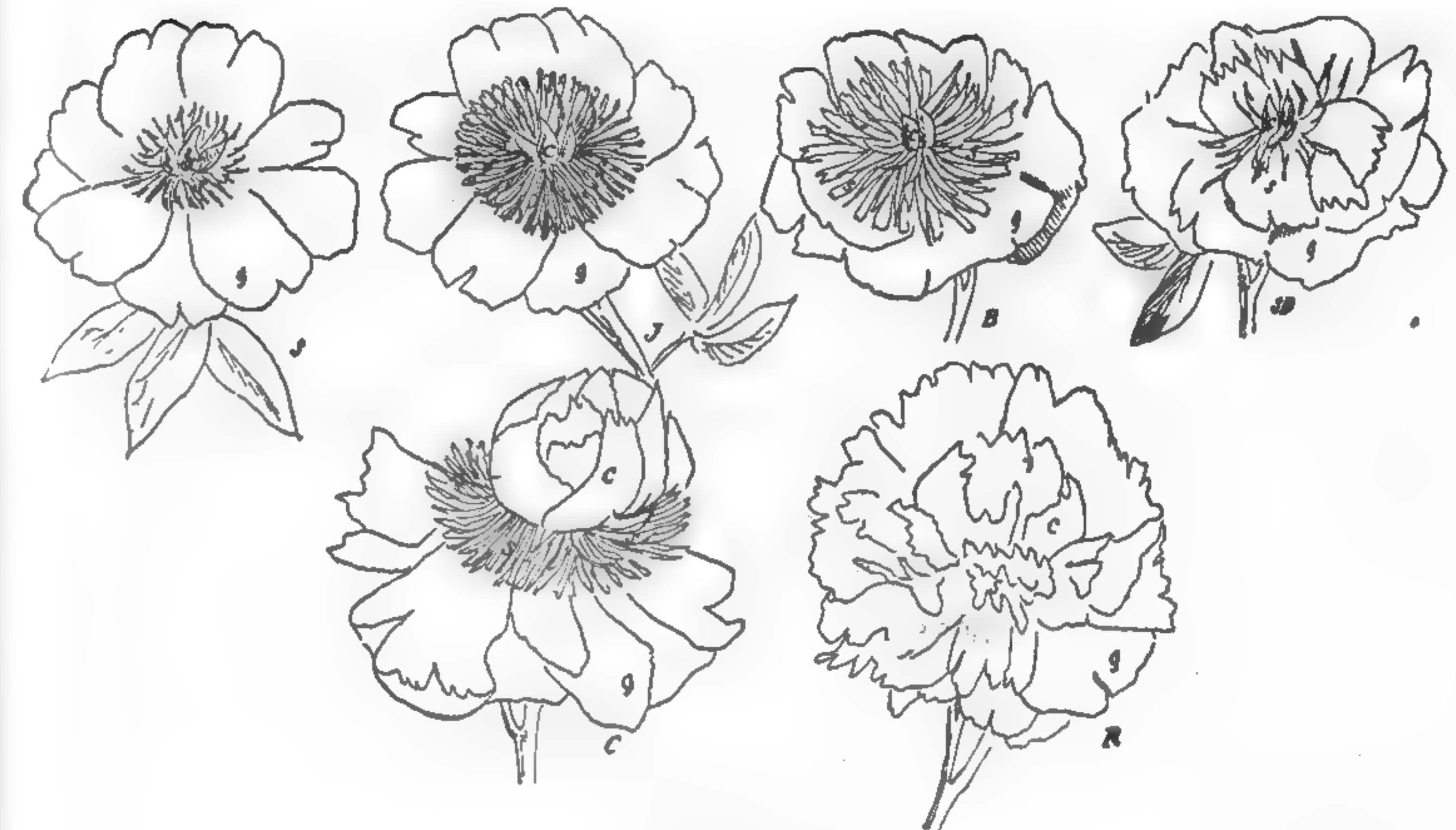
The hardy perennial Oriental Poppy, with its gorgeous scarlet, pink and crimson flowers, makes a highly pleasing show about the beginning of June. There is one double form, *Olympia*, vivid orange. These Poppies can be raised from seed, but named varieties are preferable. The Iceland Poppy (*P. nudicaule*), also a hardy perennial, with light-green fern-like foliage, bears a wealth of brilliant flowers on slim stems. This Poppy will bloom the first year from seeds if sown early but usually flowers the year after sowing. Best treated as a biennial.

Seeds of annuals should be sown early in the Spring, scattered not too thickly and covered with a light sprinkling of soil. Thin out to 5 or 6 in. apart. They do not bear transplanting.

PAEONIA · Peony

Like many other plants, intensely interesting because of their charming blooms, the Peony first came to the attention of the world as a medicinal plant. It was named after Paeon, a mythological doctor, for the roots of the species *officinalis* have been used in the making of a broth.

Peonies are easy to grow; they are permanent and when once established are impatient of being moved. They are perfectly hardy, requiring no protection except in the coldest regions. They bear large and showy flowers, ranging from white through all shades of pink to red, and some are delicately scented. The plants are so free



Types of Peonies

- S—Single, showing (g), guard petals; (s), stamens; (c), carpels or lobes of pistil
- J—Japanese type; stamens wider than in Single
- B—Bomb type. The stamens become narrow petals, called petaloids
- SD—Semi-double. Many petaloids are quite wide and are mixed among the stamens
- C—Crown. The stamens are wider and petal-like. The carpels, which before have remained unchanged, are now petal-like
- R—Rose. In this type there is an entire transformation of that bloom

from insects that they prove themselves to be ideal for cut blooms or landscape flowers.

There are a number of interesting species of the Peony. The most seen is the Chinese Peony (*Paeonia albiflora*). This is the standard Peony of which we have so many matchless varieties. The plant of the narrow-leaved or Fennel-leaved Peony (*P. tenuifolia*) is very beautiful, but the blooms last a short time. It blooms in May, the pretty scarlet flowers nestling among the dainty dissected foliage. At about the same season the shrubby or hardy tree Peonies (*P. suffruticosa*) open their enormous glossy single or double flowers. The shrubby Peony grows very slowly. It should be planted where it is sheltered from the wind. Closely following in season are the European Peonies (*P. officinalis*). These are the old-fashioned crimson Peonies of the garden; they produce very satiny-petaled blooms, which possess a not unpleasant soapy odor.

The last groups to bloom are the *albiflora* varieties. These often begin to bloom in New York State for Memorial Day. For a suc-

cession of varieties to bloom the following varieties are recommended: *P. umbellata rosea*, *l'Esperance*, *Edulis Superba*, *Monsieur Dupont*, *Richardson's Rubra Superba*, *Henry Woodward*, *Richardson's Grandiflora*. There is also a system by which the blooming of a single variety can be prolonged. Take a row, say of *Festiva maxima*; wait until the ground has frozen solid; leave the end of the row uncovered. Then, farther on, put on mulching and increase the depth until, at the other end, it is 12 to 18 in. deep; leave this on. The covering keeps the frost in; then the plant will take some time to push up through the mulching. You can apply this system to the later varieties and so lengthen the flowering season considerably.

A word may be necessary to explain the method of doubling in the Peony. The normal or single flower is composed of *petals* (we shall call all the petals, *guard petals* in this case); *stamens*, or the male part of the flower (these are yellow at the tip and bear pollen); and the *pistil*, each section of which we call a *carpel* (this is often red and bears the seed). In doubling, the stamens become wider and wider until they resemble the petals; then we call them *petaloids*. In the same way the seed-bearing power is lost by the female parts, changing to resemble petals at the center of the flower.



Peonies are glorious in a massed bed, equally striking when brought into the home, with their long stems and massive flowers

the stamens have widened; the anthers are also much developed. The guard petals, the petals at the base of the flower, are the same as in the single varieties.

The following are the types recognized by the American Peony Society:

1. *Single*. There are a few broad petals, the center being filled with stamens.

2. *Anemone-flowered*. The stamens are a trifle widened, closely resembles the Japanese.

3. *Japanese*. In this type doubling has just begun; the filaments of

4. *Bomb*. The petaloids, or the transformed stamens, have become still wider and thickly set; the petals approach the guards in form, but are still distinguishable from each other.

5. *Semi-double*. Several rows of large petals and some with petaloids in all stages of transformation. A loose bloom.

6. *Crown*. When the carpels, the parts of the pistil, transform into petals they may form a different center from the guard petals and petaloids, giving the appearance of a small Rose in the center of the flower.

7. *Semi-rose*.

8. *Rose*. A fully double form. The stamens and carpels are both transformed. It is really a developed Bomb, for in this case the petaloids are merely wider and indistinguishable from the guard petals.

The following is a list of good varieties for home grounds:

FESTIVA MAXIMA. White, center carmine; medium early.

COURONNE D'OR. A late-blooming, semi-double white.

MONSIEUR JULES ELIE. An early silvery pink.

GRANDIFLORA. Late, bright flesh pink.

DUCHESSE DE NEMOURS. Deep pink, early; a fine double.

EDULIS SUPERBA. An early dark pink.

FELIX CROUSSE. Midseason; a brilliant red.

JEANNE D'ARC. Large, soft pink; mid-season.

AVALANCHE. Milk white, with creamy center.

EUGENE VERDIER. Salmon pink, changing to clear pink.

MARIE LEMOINE. A very late sulphur white.

MODESTE GUERIN. Bright rose pink; mid-season.

MME. DUCEL. Silvery pink, flushed salmon; vigorous dwarf; midseason.

MME. DE VERNEVILLE. Rosy white, with sulphur white guard petals.

BARONESS SCHROEDER. Flesh changing to white; vigorous; excellent.

LIVINGSTONE. Fine late flower of silvery pink.

MONSIEUR DUPONT. Ivory white with lively carmine border on central petals.

LA TULIPE. Semi-double; almost white; mid-season.

DELACHIE. Dark red; semi-double; mid-season.

PLANTING AND CULTIVATION

The soil should preferably be heavy rather than light; a clay loam is excellent if it can be worked deeply. The Peony is a gross feeder and enjoys a good mulch of well rotted manure in the Winter. The time for planting is September or October, after the plant has completed its growth, but they may be planted in April if lifted with ordinary care and they often will flower and make better growth than if planted in the Fall, the latter process entailing the cutting off of the foliage, which is liable to be resented.

The plants should be planted at least 3 ft. apart and the crowns should be buried 3 in. below the surface; if planted too deeply the

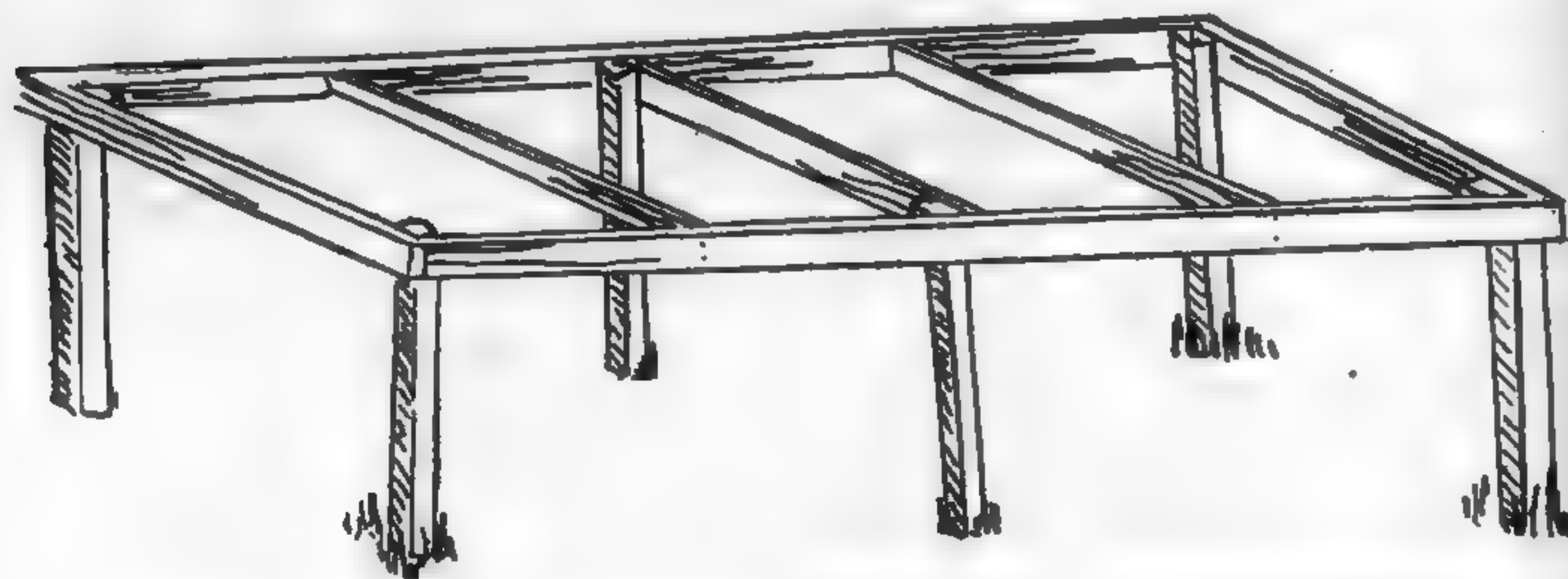
plants will not flower freely, nor will they if given a position much shaded; Peonies are true sun lovers. Furthermore, do not plant too shallow or the Winter frosts will heave them from the soil. The stalks should be cut off a few inches above the soil just before Winter; a good mulch of from 4 to 6 in. of well decayed manure will also prevent heaving and Winter injury. Occasional dusting of the ground with lime is advisable if the soil tends toward acidity. When the plants have finished blooming, the cultivation should not be neglected, since they must make a good growth and mature their foliage, else the crop of bloom for the next year will suffer. After five years Peonies should be divided and replanted, unless the plants stand far enough apart to allow root development. It takes two or three years for a commercial three- to five-eyed root to throw characteristic blooms.

DISBUDDING

The albiflora varieties produce many buds in a cluster; if the large blooms are preferred, all but the main or crown bud should be removed while they are yet small. Some weaker growing varieties are especially benefited by this practice. Single varieties need not be disbudded, unless for exhibition. When cut the flowers will last longer if slit before placing in water.

STAKING

Certain very floriferous varieties will need some sort of support. One of the best and most permanent methods is to build a rack of wood over the Peony border and train the young shoots inside of this rack. For individual plants there is no better way than to use a barrel hoop supported on three uprights.



Rack for supporting Peonies. Also used as a Tomato support

PETUNIA

This most pleasing annual may be fittingly described as everybody's flower. It succeeds everywhere, even under unfavorable conditions, and no garden, however small, is complete without it. Given a sunny location, it can always be depended upon to furnish blooms in abundance from early Summer until late Autumn. It grows 12 to 18 in. in height, produces single or double flowers of many exquisite shades and colorings, and makes a grand show in beds, borders, window boxes or vases. In recent years new and beautiful strains have been added to the



Single Petunias

Petunias succeed everywhere, even under unfavorable conditions, and no garden is complete without them

Petunia list, the blossoms being of exceptionally large size and finely fringed. Full double strains are also available. Seed is best started in March or April in a hotbed or in a box placed in a sunny window of the house. Set out the young plants, when ready, one foot apart each way. The Petunia will sometimes seed itself and come up the following season, especially the small flowered types.

PHLOX

There are Phloxes and Phloxes, dwarf sorts, and tall sorts, perennial kinds and annual kinds, huge flowering species and dainty, miniature-flowered species. They are all beautiful.

The Perennial Phloxes or Hardy Phloxes, with their huge heads of gorgeous bloom, are the most commonly grown and give a mass of color and fragrance welcome in every garden. They are of easy

culture and should be divided every three years, but cuttings rooted in the Fall make the finest plants; these and Spring rooted cuttings will flower later than divisions and thus prolong the season.

The following varieties are highly recommended:

ASIA. Light mallow purple, with small eye of amaranth purple.

B. COMTE. Vivid aster purple, with small eye of a darker shade.

BARON VON DEDEM. Near begonia rose, with small eye of near rhodamine purple.

BRIDESMAID. White with large eye of rhodamine purple.

ECLAIREUR. Near aster purple, halo of light mallow purple and small eye of aster purple.

ENCHANTRESS. Salmon pink; one of the finest.

ELIZABETH CAMPBELL. Begonia rose, shading lighter toward center, with small eye of rhodamine purple.

F. G. VON LASSBURG. White.

FRAU BOSCH BADER. White, with small eye of near rhodamine purple.

INSPECTOR ELP. Thulite pink, with small eye near rhodamine purple.

JEANNE D'ARC. White (Late).

LE MAHDI. Pansy violet, with small eye of violet purple.

MISS LINGARD. White with faint markings at center of mallow pink.

MISS COOK. White, with aster purple eye.

MME. PAUL DUTRIE. White, lightly suffused with deep rose pink, with small eye of rhodamine purple.

MODESTY. Light mallow purple, with rhodamine purple eye.

NEW BIRD. Crimson, purple eye; dwarf.

RHEINLANDER. Salmon, red eye.

WIDAR, light violet, white center.

The annual Phlox drummondii is more dwarf and embodies more excellent colors than even the perennial sorts. Best success is attained by sowing the seeds indoors and giving them a little start before putting them in the open border. There is a group with fringed petals which is known as Star Phlox, or Quedlinburg Phlox; this is novel but less attractive than the type sorts.

For the rockery and front of the borders of perennials a number of species is very useful.



Phloxes give a mass of color and a fragrance welcome in every garden

Of primary consideration is the Moss Phlox (*P. subulata*) and its varieties. This species forms huge mats of color in the Springtime; pink, lavender, blue, red and white sorts are obtainable. Phlox divaricata is the wild Sweet-william of our woods. It is most attractive, especially the variety Laphami.

There is quite a host of dwarf Phloxes for the rock garden, nearly all natives or hybrids of such.

PYRETHRUM · Painted Daisy

Valuable plants for Spring blooming, the red, white and pink daisy-like flowers being abundantly produced when the plants are established. The best time to plant is in August or September, not later or they may die during the Winter. May be planted in the Spring, but few or no flowers can be expected. Easily raised from seed but named varieties are finer. Like rich ground and should be divided every three years.

SALVIA · Sage

A favorite for beds or flowers is the flowering Sage (*Salvia*), which is remarkable for its sturdy, bushy growth and freedom of bloom and keeps the garden bright with color from July until smitten by frost. There are several good varieties, seed of which is offered. Seeds must be started in flats or hotbeds and the seedlings transplanted when the weather becomes warm and settled. Florists often propagate good types from cuttings, treating them much the same as Geraniums. The hardy perennial *S. azurea grandiflora*, blue, is a worthy late Summer subject; grows 3 ft. to 4 ft.

SCABIOSA · Pincushion Flower

The annual forms in all colors are highly useful for cutting. Treat like Asters. The perennial *S. caucasica*, various shades of blue, also should be grown. Truly beautiful for cutting. Likes a sunny situation.

SWEET PEA

The poet has a jingle upon Peas. He says:

"Peas along the border, Peas upon the lawn,
Peas against an eastern wall to welcome in the dawn.
Peas among the Roses, Peas behind the Pinks;
Peas to catch the western glow when evening sunlight sinks.
Peas upheld with Chestnut, Peas held up with Ash;
Peas asprawl on Hazel spray, Peas on Larchen brash.
Peas on stiff, unyielding wire, Peas tied up with string;
Peas upon the trellis work where Rambler Roses swing.
Oh! merry, merry, merry, are the gay Sweet Peas;
Plant them when and how you will, it's certain they will please."

It would appear from the foregoing that the answer to the question of where to plant Sweet Peas is "Everywhere," but the fact re-

mains that Sweet Peas to give a measure of pleasure require much care. They should be planted on a well drained soil only, or one in which the excessive rains of Spring will not cause water to stand around the roots and start disease. They endure little shade, for the



The Sweet Pea—perhaps the most dainty of all flowering annuals

plants should make a sturdy growth. In the shade the growth is weak and spindly and but few flowers are produced.

Place Peas, then, in the open, giving them all available light and air, although a little shade from midday suns of June and July is, of course, beneficial. Hot weather causes short stems on Peas and the best hay and grain weather ends them.

PREPARATION OF THE SOIL

This is an important point. Peas like the cool soil and attempt to strike down deeply. Dig a trench 2 or 3 ft. deep; break up and turn over the subsoil. Put in a liberal amount of stable manure and work in a heavy dressing of bonemeal. This preparation should be made in the Fall and the bed left all Winter. When working over in

the Spring give a good, liberal coating of well decayed manure or some fertilizer. If the soil is deficient in lime, dust the surface with fresh lime in Fall or Winter. As soon as frost is out of the ground in the Spring, make a furrow 5 to 6 in. deep and 6 in. wide. Sow the seed on the bottom and cover with 2 in. of soil. As the vines grow up, fill in the soil until level with the garden surface. Sweet Pea specialists advise using a liberal quantity of seed, enough to make sure of securing a good stand, and when well started, thin the plants out to 2 to 5 in. apart. Sweet Peas are often sown in double rows 5 in. apart in the trench, with trellis or other support placed between.



Roses on arches and Sweet Peas on trellises between. On either side are Rose beds in the lawn. Iris beds in the foreground

SOWING SEEDS IN POTS

In order to gain a month of bloom Sweet Peas may be sown in 3 in. pots in February indoors, shifting them to a frost-proof frame as soon as well up. Four seeds are sown in each pot. The frame should be thoroughly cleaned and dusted with soot or lime. Ventilate the frame when weather permits and plant outdoors about mid-April. Seed should be sown in open ground as early as possible, March for preference; as soon as the soil is warm enough the seeds will germinate.

FALL SOWING

For the Autumn sowing of Sweet Peas a piece of soil should be selected which will warm quickly in the Spring. Spade it up to good depth, 2 to 3 ft., but use no manure. Make a trench 2 in. deep and sow the seed thickly and cover with loose soil. When the seedlings have germinated and freezing weather has begun, cover with 4 in. of coarse litter or straw, which must be removed in the early Spring after heavy frosts are past. The seed should be sown so that the shoots are just at surface of the soil when Winter sets in; therefore, sow in late October or early in November, according to latitude.

SUMMER TREATMENT

Give frequent cultivation and when the plants are nicely flowering apply a good fertilizer and water well. If conditions are very hot and dry give the plants frequent syringings, which will keep down the red spider and will not allow aphids a chance to multiply.

STAKING

Perhaps no method is so successful as the use of brush. Stretching string from pole to pole is an easy way. Such cord can be easily removed when the Peas are through blooming. Coarse poultry yard netting is rather useful for supporting the vines, but has two objections; it must be cleaned each year, and it is thought to become heated a little too much, causing the Sweet Pea vines to dry prematurely.

GATHERING THE FLOWERS

The flowers should be kept closely picked during the blossoming season, as the vines cease to bloom when the seed pods are allowed to set.

TAGETES • Marigold

There is something captivating even about the name Marigold and all the plants bear yellow or golden flowers. Most of us, after all, love the gold.

They can be had in heights from cushion-like dwarf (*Tagetes pumila*) of the French type, and the coarser, robust African ones. Like the Zinnias, they bloom profusely and for many weeks. They all love a sunny position and do reasonably well in light soil, albeit, a fairly fertile one. Seed can be sown in May where the plants are to grow, or seedlings may be raised in hot frames in boxes to be transplanted at the latter end of April. The new Guinea Gold is a most valuable variety.

VIOLA • Pansy

Favorites with all, Pansies are rarely omitted from the flower garden, be it large or small. Everybody loves the Pansy. The reason is that the rich, velvety substance and brilliant colors of the flowers make it so radiantly beautiful and attractive. Nothing is more effective in Spring and Summer than a design or bed composed of a good selection of Pansies in full bloom; the dainty flowers also make charming table decorations. Hybridization and scientific culture have produced many wonderful strains.



Pansies are rarely omitted from a flower garden, be it large or small

Pansy seed may be sown in Spring for Summer use, where the climate is cool, but the finest blooms are produced in Spring from a late Summer sowing. For Spring flowering sow the seed late July or early August in drills covering one-sixteenth to one-eighth inch deep. Shade until seedlings appear, and when large enough to handle, transplant to stand 8 or 9 in. apart. Cultivate and keep the ground free from weeds, and apply water freely in dry weather. Protect the young plants during the Winter with straw or other light litter; they are sometimes carried over in coldframes. In extremely hot weather temporary shade should be provided, but except in the North the plants are apt to become straggly and small flowered after June is out. The hybrid race derived from *Viola cornuta* and which collectively are classed as *Violas*, are distinct from Pansies, having small flowers, usually self colored. The finest of this type is Jersey Gem, the first American raised *Viola* and notable for its ability to keep on blooming throughout the Summer. Easily increased by division and unlike the Pansy it will not tolerate any shade. Grand for the rock garden or border, its rich purple-blue flowers resembling Violets.

ZINNIA

Familiarly known as Youth and Old Age, the Zinnia stands in the front rank of garden favorites. It is, in fact, an indispensable annual and never fails to give satisfactory results. Plants are readily raised from seed sown in the open ground early in Spring and make a luxuriant growth in beds and borders, attaining a height of 2 to 3 ft. and blooming abundantly and continuously the entire season. The perfectly shaped double flowers, many of them of immense size, embrace a wide range of beautiful colors. Those who have never tried the newer orange and scarlet varieties do not know what acquisitions they have missed.



Chapter XIV

BULBS AND TUBEROUS-ROOTED PLANTS

By T. A. WESTON

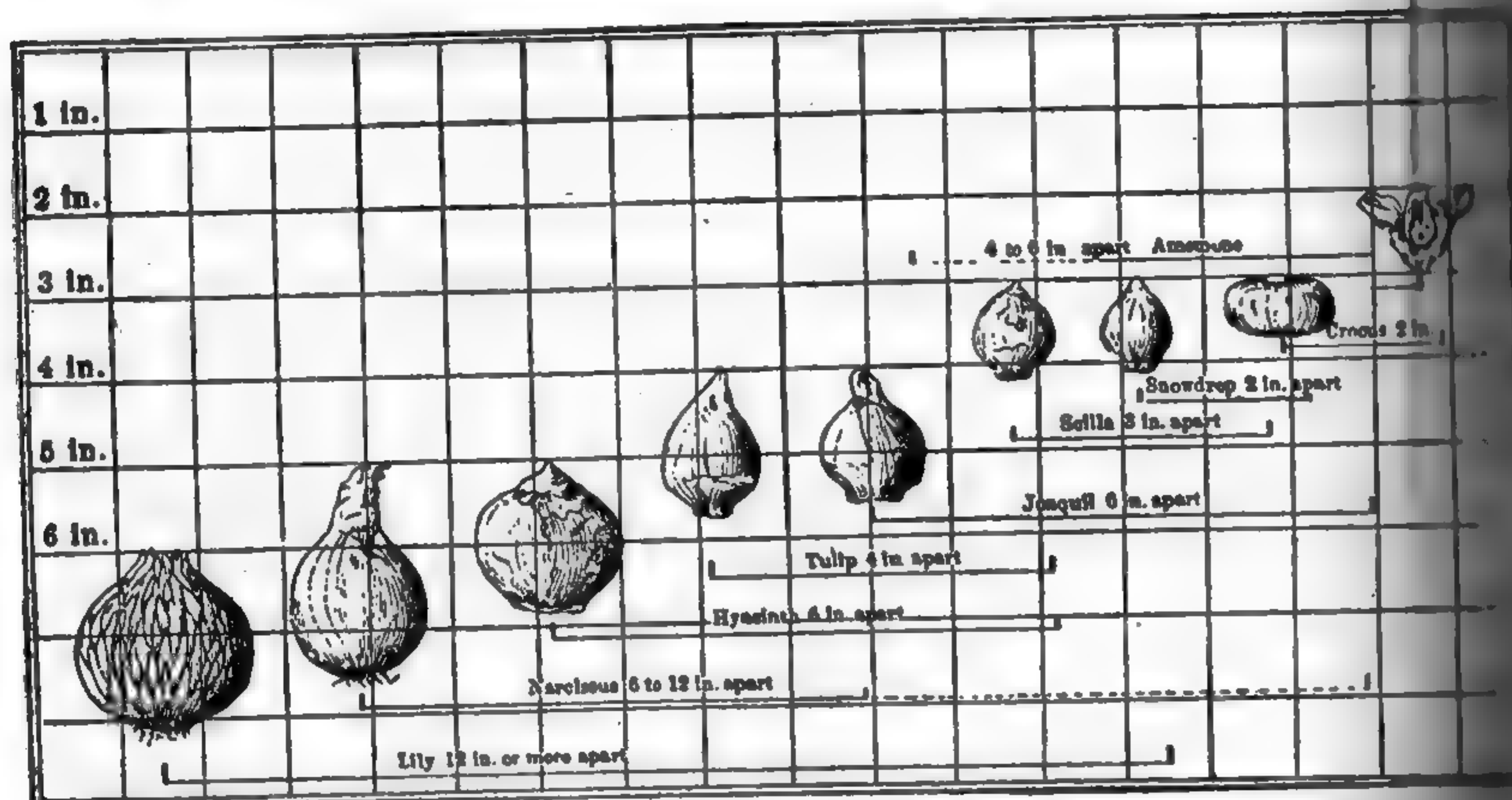
Preparation of Beds—Time of Planting—Planting—Naturalizing—Mulching After Planting—Culture During the Season—List of Worthwhile Bulbs—Descriptive List of Bulbs with Cultural Notes

MOST true bulbs when we buy them, if of mature size, contain, in embryo, both leaves and flower buds. All we need to do is to place them under some favorable conditions for growth; then they send out their roots, and by merely absorbing water, produce their blooms. They are useful for the woods, the lawn, the border, the water garden, the rockery and the window in Winter; in fact, they have a most unusual range of adaptability.

But not all so-called bulbs are truly such. True buds are made up of scales more or less like onions. They invariably show embryo leaves and buds when cut open. Tubers, such as the Anemone or Calla, as well as corms, such as the Crocus and Gladiolus, are solid fleshed, with visible growth buds at the top. If cut, no leaves or buds are visible to the eye. They are merely underground stems containing food for future growth. However, for garden purposes, all are collectively known as bulbs and the family is so extensive that flowers of one sort or another can be flowered from early Spring to late Fall, and even during Winter indoors.



Narcissus Glory of Leiden
This is but one of scores of wonderful varieties



This diagram shows approximately how deep and how far apart to plant the different kinds of hardy bulbs in light soil. In heavy soil plant an inch to an inch and a half nearer the surface

PREPARATION OF BEDS FOR BULBS

Nearly all bulbs succeed especially well on the sandier loams, but will thrive on heavy land if it is well drained and the situation where planted is lightened with sand, rotted leaves or peat moss. Manure, if used at all, must be thoroughly rotted and incorporated with the soil that it does not come in contact with bulbs. Bonemeal spread over the soil and worked in so that the basal roots can reach it, is a safe and useful fertilizer for all bulbs.

TIME OF PLANTING

Many Summer flowering bulbs are not hardy; they are planted in Spring and must be dug before Winter each year. Examples of such bulbs are: Gladiolus, Summer Hyacinth (*Galtonia candicans*), Montbretia, Tigridia, Tuberose, Zephyranthes, tuberous Begonia, Cannas and Dahlia. Most hardy bulbs require planting in the Autumn, though some, including Lilies, can be planted in the Spring, and do equally well if they have been carefully stored during the Winter. It is best to plant them as soon as they can be obtained from the dealer, who usually has a full supply by the end of November, Japanese Lilies being the last to arrive. The greater proportion of hardy bulbs are available in October and planting is best done during that

month, though in open weather the larger sorts may be planted up to Christmas.

PLANTING BULBS

The rule for depth of planting is that they should be planted twice their diameter in the soil. This does not always apply, for it is usually better to get them a little deeper. The useful chart given on page 220 shows the depth to plant. It is advisable in planting choice sorts to set them on a layer of one or two inches of sand. This will insure good drainage and keep bulbs from decaying.

NATURALIZING BULBS

For parks, groves, meadows and wild outlying grounds beyond the closely clipped lawn, a very pleasing style of naturalizing bulbous plants is now much in vogue. Such bulbs should be used as can be planted in quantity, twenty-five to a hundred or more of a kind in a patch, and only sorts should be used as are hardy and will flower and thrive and increase with neglect; fortunately, in bulbous plants there are many that succeed as well in such rough places as in the prim garden; among them are Crocus, Chionodoxas, Camassias, Convallarias, Daffodils, Muscari, Erythroniums, Scillas, Snowdrops and Trilliums. If scattered around by hand and planted where they fall,



Narcissus poeticus, naturalized
Does not this lovely scene stir you to emulation?

a natural effect is obtained. The bulbs may be dibbled in when the ground is moist and soft during the Fall rains, but on grass it is better to lift the sod, plant the bulbs and replace the sod.

MULCHING AFTER PLANTING

When cold weather sets in, a mulch of leaves, straw or like material may be used to the depth of 3 or 4 in. It serves to protect from the destructive alternate freezing and thawing. It must, however, be removed before growth extends above an inch or so. Such covering



Even the small backyard gardens can have a delightful display of choice Tulips, Narcissus and other bulbs. Just buy them and plant them

is only necessary in very cold sections and only when in open beds or borders. Tulips are most susceptible to injury.

CULTURE DURING THE SEASON

During the growing season little is needed beyond surface hoeing to keep down weeds. After blooming, the leaves must mature if the bulbs are to be depended upon for bloom another year. If it is absolutely necessary to remove before the tops are brown, the bulbs should be dug and heeled in or replanted temporarily. When ripe they can then be cleaned and stored in a dry place until planting time.

LIST OF WORTHWHILE BULBS

The following selection includes all the worthwhile types of bulbs, tubers, corms and fleshy rooted subjects that can be grown in the average garden.

ALLIUM. A race of small bulbs related to the Onion, having a characteristic odor. Quite hardy and useful in the border or rock garden. *A. moly*, yellow; *A. coeruleum*, blue, and *A. acuminatum*, pink, are the most common.

AMARYLLIS BELLADONNA is not thoroughly hardy, but in a well sheltered situation near a wall it has been flowered as satisfactorily in New Jersey and Massachusetts as in England. A rich, sandy soil is desirable and the large bulbs should be planted fully 8 in. below the surface. The large pink flowers are produced in August or later, before the foliage. The latter should be well protected during the Winter. *A. adventum*, a small, red-flowered species, also is hardy under similar conditions, this flowering in the early Fall before the foliage appears. Plant 4 in. deep and do not disturb. These two species are very common in Southern California gardens, where they multiply very rapidly. *A.* (strictly *Sprekelia*) *formosissima* is a close relative, bearing bright red, narrow-petalled flowers in June, after which foliage is produced. In a warm situation the bulbs ripen by the Fall and may be lifted and stored like *Gladiolus*. They should be planted as soon as the soil has warmed up in the Spring, covering the bulbs about 3 in.

ANEMONE. An extensive family, mostly tuberous rooted, though *A. japonica* and its relatives are more or less fibrous rooted and quite hardy. The tuberous kinds, including the red *A. fulgens* and the coronaria types, of which the St. Brigid is one strain, are not thoroughly hardy, as they make their foliage in the Fall, and if frozen no flowers can be expected. In a frame or under the shelter of a wall they will come through, but it is safer to keep the tubers in sand in a cool, dry place and plant them as early in the Spring as possible, where they will escape the afternoon sun. After they die down, lift and store in a dry place. Anemone tubers are not averse to being held in storage; even after two years the St. Brigid type is capable of growing. Can be raised from seed with frame protection.

ASCLEPIA TUBEROSA. This native plant favors dry, gravelly soil and is best left undisturbed. It can only be increased from seed.

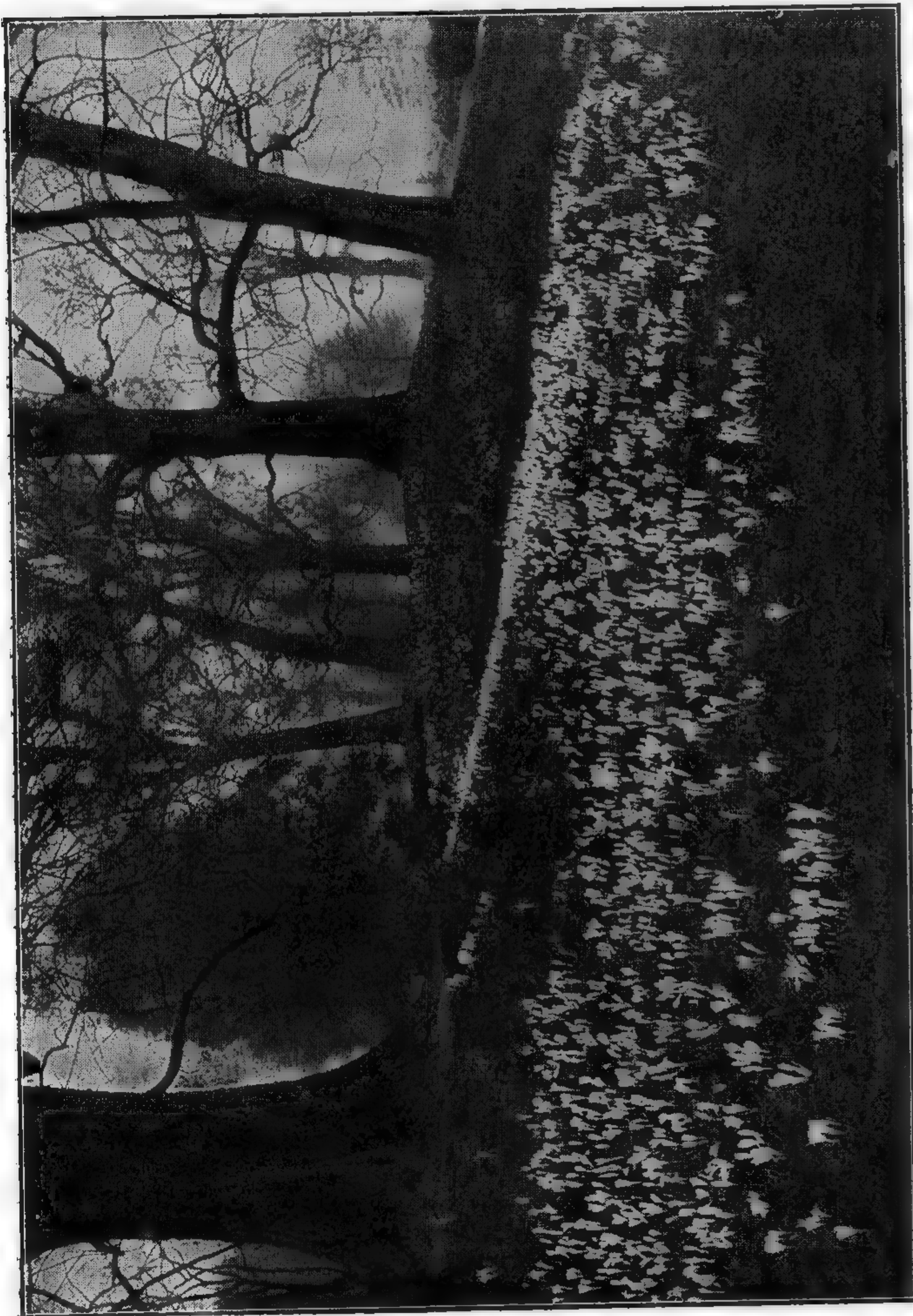
BEGONIA. The tuberous, large flowered forms are hybrids and are dealt with elsewhere. See contents. *B. evansiana*, semi-tuberous, is hardy in northern New Jersey if given a covering of litter during the Winter. Bears charming trusses of pink flowers, but demands a well shaded position and plenty of moisture while growing.

BRODIAEA. Not usually considered hardy, but the red coccinea is an attractive little thing for the sheltered rock garden, its tubular blooms being carried in bunches on long, wiry stems. Should be protected with litter during the Winter. Summer flowering.

CALOCHORTUS (Mariposa). Often called California-tulips; these require light, well drained soil, the rock garden being ideal. Can be planted in the Spring and lifted after they die down and stored in a warm, dry place over Winter, but if well protected from frost and water, they do even better in the ground.

CAMASSIA (Quamash or Common Camas). Mostly blue-flowering bulbs, but white forms exist. Perfectly hardy, they bloom in the Spring, ranging from 18 in. to 30 in. Plant the bulbs about 3 in. deep where they may have abundant moisture.

CANNA. (See Contents.)



Although it is not often that we see Crocuses naturalized in the grass in such abundance as shown in this photograph, yet they, with Snowdrops, Scillas and Daffodils, can be successfully grown in this way

CHIONODOXA (Glory-of-the-snow). Species: *Luciliae*, light blue, white center; *sardensis*, dark blue. The Chionodoxas are very closely allied to the Scillas and might easily be confused with them. They are early flowering, March or April, and are very effective when planted in huge clumps in the border. They may be planted quite deeply—4 to 5 in. is not too deep. Replant every third year, lest self sown seedlings cause overcrowding and consequent loss.

COLCHICUM (Autumn-crocus). Flowers resemble those of Crocus, but they bloom without foliage. The leaves are large and appear in the Spring; therefore it is desirable to mark their position. They like light soil and coolness after the leaves die down in early Summer. Best left undisturbed for years. The flowers will appear while in a dry state if stood in a window and the bulbs can be planted afterward, but to ensure good flowering outdoors the bulbs must be planted as soon as procurable, usually in August. *C. speciosum* is the largest flowered, but there are many species. Plant 4 in. deep.

CONVALLARIA MAJALIS (Lily-of-the-valley). Not strictly tuberous, but has a plump crown in which leaves and flower bud in embryo are stored. Much used for pots and for forcing by florists, but perfectly hardy. Likes shade and woodland conditions. Plant single crowns or clumps in the early Fall. Need no further attention until they overcrowd, when they should be lifted and the strongest crowns replanted. Rich soil makes for long stems and large flowers.

CROCUS. The Crocus is as universally admired as any bulbous plant because it can be planted in great profusion without much expense. The varieties are so bright and cheerful that they are excellent planted either in lawns, in the herbaceous border or under trees. Especially attractive are bold clumps of one variety near evergreens. Crocuses must be planted in an open place where they can get the sun in order to have them flower. New bulbs are produced above the old ones each year and the plant becomes higher and higher in the soil; they should thus be transplanted every third year. They seed themselves freely. Good varieties are: King of Whites, white; Sir Walter Scott, white, reticulated, lavender; Albion, purple; Cloth-of-gold, yellow. There are many species also, some of them flowering in the Fall, notably *C. sativus* and *C. speciosus*.

CROWN-IMPERIAL. (See *Fritillaria imperialis*.)

CYCLAMEN. The hardy forms are miniature examples of the greenhouse type, but only white, red and pink species exist. Far from common, but rock plant specialists offer them or they may be raised from seed and flowered in three or four years. Quite hardy but like partial shade and plenty of leafmold. Three species are *Coum*, *Europeum* and *Hederaefolium*, all perfect gems. Protect during Winter as some retain their foliage. *Europeum* flowers in the Fall; others in Spring.

DAHLIA. (See Contents.)

ERANTHIS HYEMALIS (Winter-aconite). This yields very cheerful yellow, star-shaped flowers and is very hardy, liking best to be planted in partial shade. It blooms as soon as the frost is out of the ground, whether it is February or April. Plant the small bulbs in clumps. Seeds freely but seedlings are slow growing.

EREMURUS (Desertcandle). Species: *robustus* and *himalaicus*. This is a very stately subject for the garden. The spikes are frequently 6 to 8 ft. tall and are covered with white, pink or yellowish flowers, which continue to open for nearly a month. The large fleshy roots should be planted rather shallow, in a fairly rich but very well drained soil. These plants are native to desert spots of Western and Central Asia. The matter of Winter protection is important, for the plants should be covered with leaves during the Winter and left till quite late, otherwise the young shoots will often be injured. The roots are quite fleshy and spread out in all directions; they should be planted as soon as received in November. Can be raised from seed but take six years to bloom.

ERYTHRONIUM (Troutlily). Relatives of the Lily; many species are natives, *E. grandiflorum* (Glacierlily) is the finest, but all are worthy of culture. Woodland conditions suit them.

FRITILLARIA IMPERIALIS (Crown-imperial). The Crown-imperial, which was such a familiar feature of the gardens of our grandfathers' time, has been very much neglected of late. In the Spring, when the bulbs start into growth, the stem elongates very rapidly until finally it is surmounted by a crown of flowing bells and a tuft of leaves. They are very interesting as seen in the distance, but even more so when examined carefully close at hand. The bulb seems very susceptible to injury and should not be kept out of the soil for any length of time. They should be planted about 4 or 5 in. deep and on their sides, because they often decay easily; preferably cover them with sand. They enjoy a rather rich soil and when once established grow very easily. Crown-imperials vary from red to yellow and they have a rather strong odor. The Guinea Hen Flower, *F. meleagris* is smaller and the curiously marked blooms are borne singly. This species prefers a naturally moist soil.

GALANTHUS (Snowdrop). The Snowdrop is one of the first flowers of Spring to bloom, the little white inverted bells appearing in January in a mild Winter. Plant in clumps for the individual flowers are too tiny for a show. The clumps increase rapidly. The common Snowdrop, *G. nivalis*, is earlier, but the larger form, *G. elwesii*, is much finer.

GALTONIA CANDICANS (Summer-hyacinth). Here is a bold, stately, bulbous plant which may be admirably used in the back line of a border. The tall spikes of inverted white bells give a very pleasing effect, and seem to contrast most exquisitely with many of the medium tall growing perennials, such as *Monarda* and *Coreopsis*, or with annuals such as Bachelor Buttons and Snapdragons. The bulbs are not strictly hardy and must be dug each Autumn and planted the following Spring. It is perhaps advisable to buy a new stock each year, as the bulbs, after blooming, rarely are equal to flowering the next year. The young bulbs can be grown on or they may be raised from seed, but they should not be allowed to bloom until the second season.

GLADIOLUS. (See Contents.)

GLORY-OF-THE-SNOW. (See *Chionodoxa*.)

GRAPE-HYACINTH. (See *Muscari*.)

HYACINTHUS CANDICANS. (See *Galtonia*.)

HYACINTHUS ORIENTALIS (Hyacinth). For garden culture many persons feel that the Hyacinth is a trifle stiff and formal, but there is a group known as miniatures, which are useful. The spikes of the miniatures are graceful and produce a very pretty, loosely arranged spike of bloom. They are adapted to informal planting in the border and are useful for cutting. The larger varieties are known as Dutch Hyacinths and are adapted for more regular and formal planting. The Hyacinth appreciates a lighter soil than most bulbs, but they revel in rotted manure placed well below, so that the roots only can reach it. In very cold regions, a surface covering is advisable. Where they can remain permanently, plant 8 in. deep; they will last for years.

HYMENOCALLIS (Peruvian-daffodil or Spiderlily). The species *calathina* is a pure white Summer flowering bulb of great beauty. Plant in the Spring in sandy soil and lift and store like *Gladiolus*.

IRIS (English, Dutch and Spanish Iris). Unlike the German and Siberian, this class of Iris is bulbous. The bulbs are cheap, the English embracing only blue and white, the Spanish including bronze and yellow shades also. The Dutch Iris are similar to Spanish, but a trifle earlier and perhaps less hardy. Plant them in good, friable, well drained soil the latter part of September. They will bloom in May and June. The Spanish Iris and Dutch will start into growth

immediately upon being planted. The English will wait till Spring before sprouting. The English have wider petals and are somewhat larger, but the Spanish and Dutch are about two weeks earlier. It is essential to give them a well drained position and, to ensure continued good health, the bulbs should be lifted when they die down and kept in a warm, dry place until planting time. In milder sections they can, however, be left in the ground. There are numerous other bulbous species of Iris, some not hardy in the North, but *I. reticulata* is a gem for the rock garden, flowering in March or April. The bulbs should be planted where they are hot and dry during the Summer. (For rhizomatic Irises, see contents.)

LILIES. (See Contents.)

MONTBRETIA (*Tritonia*). Related to the Iris, the common *M. crocosmaeflora*, is hardly worth growing since many beautiful hybrids are available at moderate rates. *His Majesty* and *Una* are two giant flowered varieties. Yellow and bronzy red shades predominate. Growing like small *Gladiolus*, they flower in late Summer and in sections south of Philadelphia, they may be left undisturbed until the bulbs overcrowd. In cold districts the bulbs are safer if taken up and buried in a frame or under the shelter of a wall where they are fairly dry and not subjected to hard freezing. The bulbs should not be dried off like *Gladiolus* as they produce succulent runners on which new bulbs are formed; if these are dried off much of the increase will be lost.

MUSCARI (Grape-hyacinth). Here is a little gem for the garden. The blue and white miniature bells, when seen in mass, are most attractive either in the border or when naturalized in grass or woodland. There are several other forms which are intensely interesting, especially the plumed or feathery Grape-hyacinth (*Muscari plumosum* var. *monstrosum*). In this the floral parts are much elongated and appear very feathery. It grows only 6 or 8 in. tall and needs to be planted in front of a border or in a rockery.

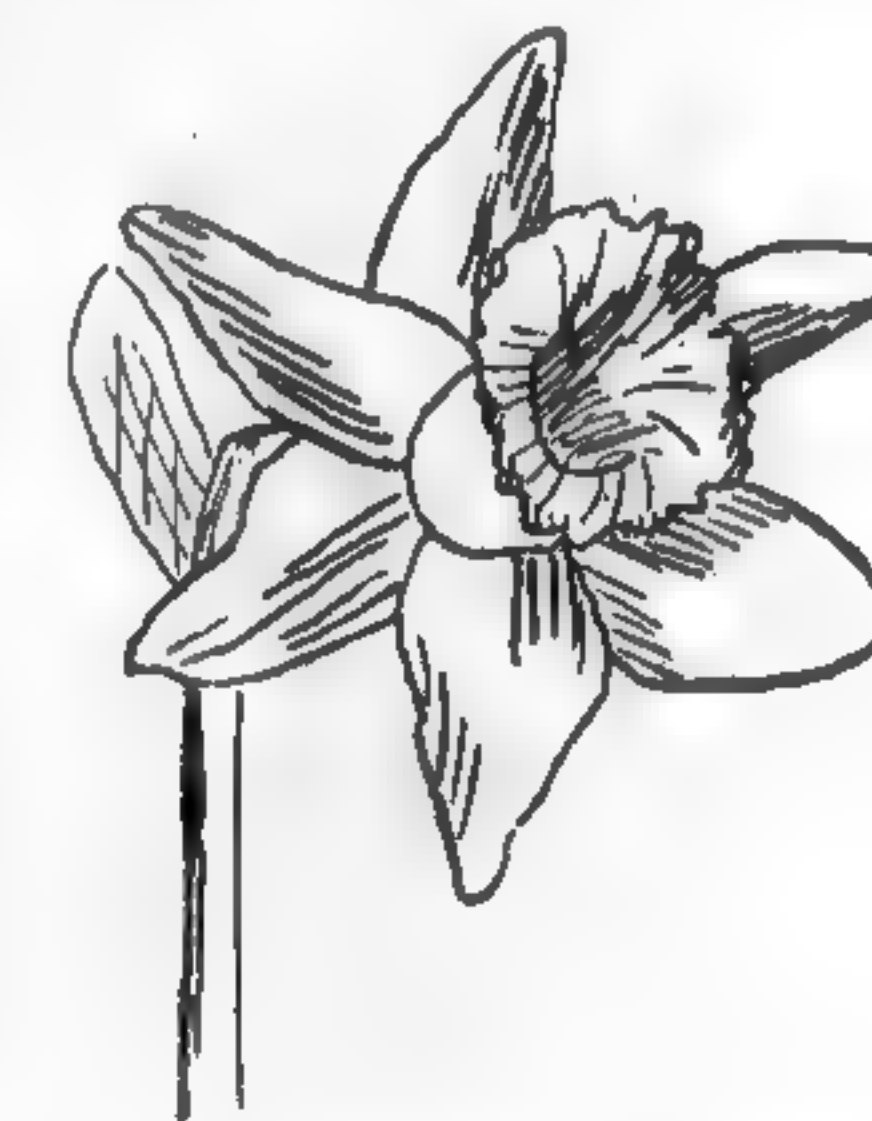
NARCISSUS. There are a great many types and species of Narcissus. The following is a brief classification of the various types.

Long Trumpet. To this class belong all varieties with distinct tubular centers which are as long as the outer parts of the flower. There are three groups of the long trumpet Narcissus; self yellow, bicolors, and white. There are hundreds of varieties. *King Alfred*, *Empress* and *Mrs. Krelage* being good examples of the three groups.

Doubles. *Von Sion*, properly *Telamonius plenus*, is a showy old variety. There are numerous other doubles, *Orange Phoenix* and *Sulphur Phoenix* being the finest.

Medium Trumpet. To this class belong all varieties with distinct tubular centers, which are about half as long as the outer parts of the flower. Good examples of this type, known as *Incomparabilis*, are *Lucifer*, yellow with red cup, and *Sir Watkin*, larger, and all yellow.

Short Trumpet. To this class belong all varieties in which the center is a mere cup. The yellow or white forms with yellow or red cups are collectively known as *Barri* type. *Flame* and *Firebrand* are examples. The all white varieties are known as *Leedsii* and there are many giant hybrids of this



This represents a typical flower of a single Daffodil often, but wrongly, called Jonquil. The Jonquil much more resembles the Paper-white; except that it is yellow. Daffodils are large study in themselves.

class. The whole of the above groups are popularly known as Daffodils. *Poeticus*. Collectively known as Pheasanteye Narcissi, these have pure white flowers with a red rimmed short cup or center. Hybrids of these include the bunch-flowered Poetaz or Polyanthus Narcissi, some of which are hardy. The other parent of these, *N. tazetta*, is not hardy, examples of which are the well known Paperwhite. The Poets Narcissus is sweetly scented and most valuable for cutting.

Jonquils. These are short-cupped, pure yellow types, usually bearing their flowers in pairs. Sweetly scented. They are readily distinguished from all other Narcissi by their narrow, rushlike leaves. Charming for woodland or the rock garden. Not so hardy as the general run of Narcissi, but a little litter is sufficient protection. The name Jonquil is often erroneously applied to the Trumpet Narcissi or Daffodils.

Triandrus. This group is none too hardy, but the species and its hybrids have waa-like flowers and they, with several other tiny species, are ideal for the rock garden.

PEONY. (See Contents.) These, like the rhizomatic Irises, are not truly bulbous or tuberous, but because of their fleshy roots they are often grouped as such.

RANUNCULUS. Having small roots like miniature Dahlias, these are not hardy in northern regions, but like Anemones, they may be grown in protected frames or planted in sandy soil in the early Spring. They need shade from hot sun, but if they can be grown, the flower lover will be delighted with their large, Peonylike flowers in all shades of color. When at rest the roots must be kept dry and warm. They flourish in the mild climate of California.

SCILLA OR SQUILL. Species: *sibirica* (Siberian Squill), *hispanica* (Spanish Squill). The Siberian Squill bears an intensely blue flower which is unexcelled for the planting of entire beds. The bulbs are extremely hardy, needing almost no care. The Wood hyacinths are white, light pink or blue, and are very showy used as clumps in borders or woodland. They much resemble the Hyacinth, except that the blooms are much more sparsely arranged. Usually listed as *S. campanulata*.

SNOWDROP. (See *Galanthus*.)

SUMMER-HYACINTH. (See *Galtonia candicans*.)

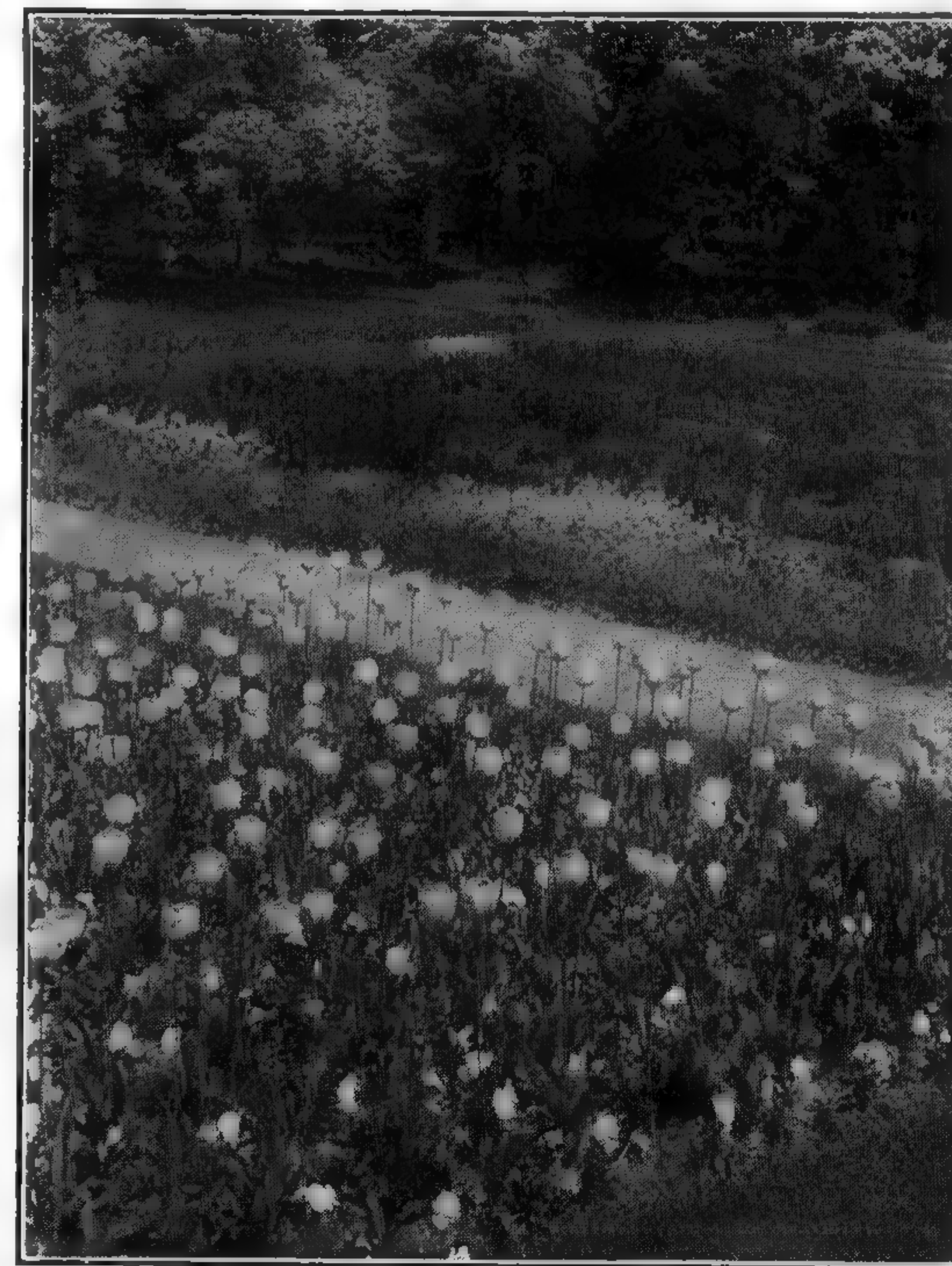
TIGRIDIA (Tigerflower). These gorgeous Mexican bulbs are not well known. They should have light, rich soil in the Spring like *Gladiolus*. They flower over a long period though the brilliant, spotted, three-petaled blooms are short lived. In late Fall, the bulbs may be lifted with tops attached, tied in bunches and hung in the cellar until thoroughly dry; then clean and store in a ventilated box to protect from mice. Keep in a warm cellar or room. When planting do not divide the bulbs; allow them to fall apart naturally.

TRILLIUM (Wakerobin). Native woodland tuberous-plants. Very charming in the Spring, especially *T. grandiflorum*. Should be planted early in the Fall and quite deep.

TULIPS. The finest garden subject among the Dutch bulbs is, in the opinion of many, the Tulip. It is so hardy, the colors are both dainty and vivid, the form is exquisite, and the ease of success commends it to every garden. The name has been derived from the Persian *toliban*, or turban, which the flower resembles. There are a number of forms of Tulips, all of which are interesting. The early Dutch, flowering during April and early May, are fairly dwarf and include a tremendous range of colors, single and double. What may be termed a midseason race has been evolved by crossing the early and late types, they being taller than the earlier. These are offered in variety as Mendel and Triumph Tulips. The late types are the most valuable, flowering in May and even in early June if the weather is not extremely hot. The late varieties number many hundreds and are divided into

several groups. The Cottage types embrace all colors and are usually less regular in outline than the Darwins which are globular, generally on very tall, strong stems, the colors embracing all shades except yellow. The reds, pinks and purples are especially fine. Breeder Tulips are an older type, usually self colored, and remarkable for their brown, purple and coppery tints. In form and vigor they resemble the Darwins. The Rembrandts are striped forms of Darwins while the Old English are all striped on yellow or white grounds. These latter are not over vigorous and might be termed specialists Tulips. It was Tulips of this class that caused the great Tulip mania in Holland in the early days of Tulip culture. There are also various fringed striped late Tulips known as Parrots. These are rather weak stemmed and better for indoor culture but their strange colors are striking. The various Tulip species are highly interesting, especially for the rock garden. Notable forms are *Tulipa clusiana*, *T. kaufmanniana* and *T. greigi*.

WINTER-ACONITE. (See *Eranthis hyemalis*.)



Tulip Bouton d'Or

The most handsome of the long-stemmed yellow Tulips

*For a complete work on the subject of this chapter
we recommend*

ALL ABOUT FLOWERING BULBS, by T. A. WESTON
Secure this book where you bought your Garden Guide

Chapter XV

HARDY GARDEN FERNS

By WILLARD N. CLUTE

What a Fern Is—Fern Spores—Propagation—Transplanting
—Tropical Ferns—Desirable Garden Ferns—Fern Allies

"NATURE made ferns for pure leaves to show what she could do in that line," wrote Thoreau, long ago, and fern students generally have been disposed to agree with him. Certainly, there is no other group of plants in the world that shows greater variation in the form and cutting of the leaves, or which has more graceful and pleasing outlines. So endlessly are the leaves subdivided that many other plants with finely cut leaves are often mistaken for ferns by the beginner. There are, however, various species with coarse and undivided leaves, especially in the Tropics, but these only serve as foils for the rest.

In size, fern leaves range from species so tiny that a whole plant may be covered by the finger tip, to heavy palmlike forms with leaves 15 ft. or more in length. There is a similar difference in texture. The



A Fern border

Filmy Ferns have leaves only one cell thick, while others have leaves so thick and leathery as to be heavier than the leaves of ordinary plants.

We commonly think of ferns as inhabitants of cool, moist places, such as shady woodlands and dripping cliffs, but many species are adapted to extremely arid habitats and thrive on sun-baked cliffs, old walls and even on the roofs of houses. They also live on the trunks and larger branches of tropical trees, curling up and appearing as if dead when no moisture is available, and becoming green again a few hours after a rain.

WHAT A FERN IS

The plant we call a fern is really only half a fern. There is another half, fully as important to the species, though seldom seen by the student. When a fern spore germinates it produces a thin, green, heart-shaped scale, smaller than the blunt end of a lead pencil, which is known as the prothallium or gametophyte. This is attached to the soil by slender rootlike structures on the underside and bears two kinds of one-celled bodies which are known as sperms and eggs, respectively. When a sperm and egg unite, they form a structure also known as a spore, and it is from this latter that the object we call a fern plant grows. In its infancy and while still attached to the gametophyte, it puts forth a tiny root, stem, leaf and bud and thus becomes independent of the mother plant which soon dies and disappears.

FERN SPORES

The fern plant thus originated may live for many years, producing a crop of spores annually, often 5,000,000 spores on a single leaf. These spores, however, are quite different from the spores already mentioned and instead of directly producing new fern plants give rise to the bodies from which the green scales or gametophytes are produced. The fern, therefore, has two different kinds of plants and two different kinds of spores alternating in its life cycle. Ordinary ferns produce their spores on the backs of the leaves. In many cases the spore bearing leaves are practically like the foliage leaves in appearance, but in perhaps the majority there is a noticeable difference and those with spores are then known as sporophylls. These often lose their green color and devote all their energies to spore production. The sporophylls of the Ostrich Fern, the Cinnamon Fern, and the Sensitive Fern will illustrate extreme forms of sporophylls. Occasionally, also, spores are produced on both surfaces of the leaves.

The spores, themselves, are borne in minute globes called sporangia, each containing about 64 spores. The sporangia are arranged in groups known as sori and, when young, may be protected by a thin membrane called an indusium. The shapes of sori and indusia are so constant and so characteristic that they serve admirably to distinguish the different fern groups from one another. The sori of the *Aspleniums* are short and broad, those of the *Aspidiums* are round or heart-shaped, those of the *Bracken* are thin lines on the edge of the leaflets, and so on.

PROPAGATION

There are various ways of growing ferns from spores. The spores may be sown on moist soil, on an old brick or other porous object with its base in a shallow saucer or water. Sometimes the hole in an unglazed flower pot is stopped up, the pot filled with water and the spores sown on the outside of the pot. The water will seep through the walls of the pot in just the right amount to facilitate growth. When the young plants appear they are pricked out into flats or pots as soon as they are large enough to be transplanted. Before sowing the spores it is well to sterilize the pots or soil by steaming or baking to prevent the growth of molds or algae which otherwise might spring up and overwhelm the slower growing ferns. For similar reasons, as well as to surround the plants with a moist atmosphere, a bell-jar or pane of glass should be placed over the sowings.

Many ferns have developed various short cuts to reproduction that omit the scalelike gametophyte. Thus, the *Bladderfern* develops small bulblets on the leaves which fall off and produce new plants. Some of the greenhouse forms go still further and produce whole families on a single leaf. The leaf of the *Walking Fern* bends over and roots at the tip, the underground rootstocks of other species branch frequently, producing new ferns at their tips, and the *Bracken* creeps widely beneath the surface of the soil, sending up its great triangular fronds at frequent intervals.

The fern plants, themselves, are easily accustomed to life in the garden. Most of them require only shade, moisture and a friable soil, the latter usually to be obtained in the places where the plants grow wild. The water and bog-loving species will grow in ordinary garden soil, though they will probably come to their best only in boggy situations. If the soil in the fern garden is not suitable and there is no opportunity to renew it all, a large hole may be dug for each specimen and this filled with good soil, like a great flower pot. Rock-loving species



Hay-scented and Christmas Ferns

are naturally at home in the rock garden. All ferns seem to thrive with much moisture, but only the species of swamps and bogs can endure standing water.

TRANSPLANTING

Ferns may be transplanted from the wild at any time of the year, though early Spring and late Autumn are the best for this work, because the plants are dormant then. In any case, the roots must be kept constantly moist until planted, and if much of the root system has been lost in digging, the tops should be cut back to correspond. Most ferns favor soils with lime in them, and some insist on such soils,

but good garden soils will suit most of them and only the bog species need an acid soil.

TROPICAL FERNS

The tropical ferns must, of course, be grown in a glass house of some kind. Since there are about six thousand species to choose from, a wide range is possible. There are climbing ferns, walking ferns, creeping ferns, perching ferns, tree ferns, filmy ferns and many others. The last named are happy only in a very moist atmosphere and are best grown in a "Wardian case" or fernery.

DESIRABLE GARDEN FERNS

Practically any of our ferns will thrive under cultivation if given a situation similar to that in which they originally grew. Those named below are especially desirable for the garden. There are also a considerable number of Western and Southern species that may be grown with slightly more care in the fern garden or greenhouse.

ADIANTUM PEDATUM. Maidenhair. Prefers a well drained, light soil in shade.

ASPLENIUM ANGUSTIFOLIUM. Narrowleaf Spleenwort. Rich woodlands in moist soil. A tall species fond of ravines but rare in many places.

ASPLENIUM PLATYNEURON. Ebony Spleenwort. Thrives in sunny places and in rocky soils. A small, trim plant suggesting a small Boston fern.

ASPLENIUM RESILIENS. Small Ebony Spleenwort. Much resembles the preceding. In rocky soil in the Southern States.

ASPLENIUM TRICHOMANES. Maidenhair Spleenwort. The small, slender leaves form rosettes in the clefts of limestone rocks. A fine rock garden plant.

ATHYRIUM FILIX-FEMINA. Lady Fern. Rich loam in sun or shade. Abundant and highly variable. One of the commonest ferns in cultivation.

ATHYRIUM THELYPTEROIDES. Silvery Spleenwort. Rich woods in moist soil. A tall species desirable for garden use.

BOTRYCHIUM OBLIQUUM. Grapefern. A curious species that fruits in late Summer or Autumn. Fronds small, triangular, surmounted by a spike of fruit on a separate stalk. Found in old fields and occasionally in woodlands.

BOTRYCHIUM VIRGINIANUM. Rattlesnake Fern. A tall species in rich shades. Fruiting part suggests the rattles of the rattlesnake.

CAMPTOSORUS RHIZOPHYLLUS. Walking Fern. A curious small species with entire slender leaves that root at the tip. Forms little mats on rock ledges. Excellent for the rock garden.

CYSTOPTERIS BULBIFERA. Bladderfern. Found on dripping rocks but will thrive in the rock garden. Reproduces by small bulbs produced on the underside of the leaves.

CYSTOPTERIS FRAGILIS. Brittle Bladderfern. Found on cliffs and in shady woodlands. A slender form for the rock garden.

DENNSTEDTIA PUNCTILOBULA. Hay-scented Fern. A species with fragrant fronds, common in rocky places and fond of mountain tops and other elevated regions. Spreads rapidly and forms colonies about rocks.

DRYOPTERIS CRISTATA. Crested Woodfern. In swamps and wet woodlands. Excellent for the garden. Fertile leaves erect; sterile leaves deciduous.

DRYOPTERIS FILIX-MAS. Male Fern. A rare fern found only in our northern tier of states and in mountains further south. Common in England and more widely distributed in Canada. Thrives under cultivation.

DRYOPTERIS GOLDIANA. Goldie's Fern. A tall and handsome species resembling the commoner Marginal Shieldfern, but rare in many regions.

DRYOPTERIS HEXAGONOPTERA. Broad Beechfern. A small plant with triangular leaves in moist shades.

DRYOPTERIS MARGINALIS. Marginal Shieldfern. Rich soil in dryish shades. An evergreen species; one of the best for decorative planting.

DRYOPTERIS NOVEBORACENSIS. New York Fern. A delicate species of damp shades; easily cultivated.

DRYOPTERIS SPINULOSA. Toothed Woodfern. A tall fern with finely cut foliage. Its varieties are much used for planting. This species supplies the ferns so extensively used by florists in bouquets.

DRYOPTERIS THELYPTERIS. Marshfern. Abundant in bogs and marshes. A slender species that is easily grown but not much used.

LYGPODIUM PALMATUM. Climbing Fern. A rare species with twining leaves often 3 ft. high. Leaflets palmately branched. Easily grown in moist shades.

ONOCLEA SENSIBILIS. Sensitive Fern. Wet soil in sun or shade. A coarse species unlike common ferns.

OSMUNDA CINNAMOMEA. Cinnamon Fern. Our commonest swamp fern, forming large crowns 3 ft. or more high. Root-stocks large, difficult to transplant.

OSMUNDA CLAYTONIANA. Interrupted Fern. Very much like the preceding, except that the former bears its spores on separate leaves that are cinnamon colored. It also grows in drier places, along roadsides, etc.

OSMUNDA REGALIS. Royal Fern. In swampy ground; common. Leaves often a yard long, twice pinnate. Takes kindly to cultivation.

PELLAEA ATROPURPUREA. Cliffbrake. An evergreen species with blue-green leaves growing on the driest cliffs. Good for the rock garden.

PHLEGOPTERIS DRYOPTERIS. Oakfern. Rich shades. Leaves of three triangular divisions. Useful in the rock garden.

PHLEGOPTERIS POLYPODIOIDES. Narrow Beechfern. Similar to *Dryopteris hexagonoptera* but an inhabitant of wet rocks.



Athyrium filix-femina or Lady Fern

- POLYPODIUM VULGARE.** Polypody. Abundant on dryish rocks. One of the best plants for the rock garden.
- POLYSTICHUM ACROSTICHOIDES.** Christmas Fern. One of our commonest evergreen species. In rocky woods. Much used by florists.
- POLYSTICHUM LONCHITIS.** Mountain Hollyfern. A northern species much resembling the Christmas Fern. Thrives in rich, rocky soil.
- PTERIS AQUILINA.** Bracken. A coarse fern with triangular leaves, often 2 ft. broad, and a deeply running root stock. Leaves produced singly. Interesting but hard to establish in the garden.
- SCOLOPENDRIUM VULGARE.** Hartstongue. One of our rarest American ferns. Leaves a foot or more long, undivided. Common in Europe whence specimens may be obtained.
- STRUTHIOPTERIS GERMANICA.** Ostrich Fern. Our tallest American species, often 6 ft. high. Prefers moist, sandy soil. Will grow nearly everywhere and often is used for decorative planting.
- WOODSIA ILVENSIS.** Rusty Woodsia. Found on dry cliffs where it forms dense colonies. Easily established in the rock garden in any well drained position.
- WOODSIA OBTUSA.** Obtuse Woodsia. Fairly common on rocks and much resembling the commoner *Cystopteris fragilis*. It thrives in the rock garden.
- WOODWARDIA AREOLATA.** Narrowleaf Chainfern. A species of bogs, rare in the interior states. Resembles the commoner Sensitive Fern.
- WOODWARDIA VIRGINICA.** Chainfern. A fine tall species resembling the Osmundas. Prefers a boggy soil and sunlight. Forms colonies in wet places.

FERN ALLIES

Allied to the ferns are a large number of strange plants that are similar to them and known as the Fern Allies. These comprise the Scouring-rushes, Water-clovers, Selaginellas, Groundpines, Quillworts, Pepperworts and the like. Many of these are easily grown, but the Groundpines do not take kindly to the garden. Selaginellas, however, are to be found in nearly every greenhouse. The Water-clovers are readily grown in a tub or pool and the Waterfern (*Azolla*) will cover the surface of quiet pools. A descriptive list of desirable Fern Allies follows:

- AZOLLA CAROLINIANA.** Waterfern. A minute, reddish plant that grows in quiet waters so abundantly as to cover the surface. Often grown in aquaria and garden pools.
- EQUISETUM ARVENSE.** Field Horsetail. Very abundant in sterile soil, railway embankments, and the like. Fruits in earliest Spring. Good for covering banks.
- EQUISETUM HYEMALE.** Scouring-rush. Stiff, bamboolike plants in wet places; fine for the borders of garden pools. There are several other species.
- EQUISETUM SYLVATICUM.** Wood Horsetail. Delicate and much branched plants of moist shades, useful about garden pools.
- MARSILEA QUADRIFOLIA.** Water-clover. Grows in shallow water. Leaves like four-leaf Clovers, closing at night. An interesting plant. There are several other species.
- SALVINIA NATANS.** Salvinia. Tiny floating plants with oblong leaves. Covers the water in quiet pools.
- SELAGINELLA APUS.** Creeping Selaginella. A mosslike plant in wet grounds, appearing early in Spring and forming large patches. Related to the Selaginellas of the florist.
- SELAGINELLA RUPESTRIS.** Rock Selaginella. Plentiful on granitic rocks and boulders. Mosslike in appearance but much more robust.

The fernworts are usually more easily identified than other groups of plants. The flowering plants are often hard to distinguish when not in bloom, but the ferns are in proper shape for study throughout the growing season. Even dead and dried specimens can be identified as easily as fresh ones, provided only that sporophylls are present. Most of our northern forms can be identified by merely matching them with the pictures in any good fern book.

*For complete works on the subject of this chapter
we recommend*

OUR FERNS IN THEIR HAUNTS, by W. N. CLUTE

A full and accurate account of the ferns east of the Mississippi, including their folklore, common names, etc. There is an illustrated key to the species, illustrations of every species (225 in all), a check list of the ferns and a good glossary. 332 pages.

and

THE FERN ALLIES OF NORTH AMERICA, by W. N. CLUTE

The only book in the world devoted to a popular account of those strange relatives of the ferns—the Scouring-rushes, Clubmosses, Groundpines, Water-clovers, Quillworts and similar plants native to America. 288 pages and 155 illustrations

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Chapter XVI

CACTI AND OTHER SUCCULENTS AND THEIR CULTURE

By CARLETON A. SCHEINERT

What Are Succulents?—The Cacti—Other Succulents—
Propagation and Culture

SUCCULENTS are those plants which have thick, pulpy leaves and stems, filled with cells for the storage of hard-won water, and paraffin-like skins. There are many family groups within this succulent division of the plant community, of which the Cacti are the most popular. Botanists tell us that the Cactus is a cousin of the Rose—which we may possibly doubt as we look at the thick and spiny stems! But when we see them during their season of bloom, we find we can distinguish the form of the Rose, of the Dahlia, Lily, Hibiscus, and many others.

European countries have shown appreciation of these sturdy and characterful plants, which are native to the Americas, since the time of the early explorers, who took home with them specimens of the strange plants of the New World. In England there are the famous Kew Succulent Gardens, and not only window boxes but gardens attest the popularity of these plants in several of the countries. We find flower shows being held, not only in the United States, but in such centers as Rotterdam, where only the Cacti and other succulents find a welcome—and the entries number into the thousands.

THE CACTI

Cacti (this being the plural of Cactus) prove of interest the full twelve months of the year, for the stems and spines are always attractive and colorful. The Rainbow has a green stem showing through even lines of soft reds and yellows. Others have spines of red, yellow, black or purple. Some appear one color when dry and change to another brilliant hue when lightly sprinkled.

The blooming season, between the last of March and late September, is a time of added attractiveness, for we find that the colors and forms of the flowers vary almost as much as do the stems from which



Left, *Opuntia basilaris*, a spineless form of *Opuntia* in bloom; right, the *Phyllocactus*, a leaf Cactus, and its flowers

they spring. We see a small globular Cactus give forth a great, lily-like flower several times as long as the plant itself is tall. A much larger member of the family will wear a crown of small flowers in delicate yellows or magentas, in the form of a Daisy.

No one knows just how many different kinds of Cacti there are, new specimens being found even today, and culturists are introducing many hybrids as they study these strange plants. However, there are some two thousand named kinds, enough to give us a selection to suit our individual wants and tastes. Such is the fascination of these "contrary" plants that to own but one means that we will soon have a nice collection.

The Cacti have been divided by botanists into several groups according to differences in the flower tube. The best known is possibly the Night Blooming *Cereus*. These actually bloom at night, the long and narrow stems, which grow upward and cling to supports by means of aerial roots, being profusely filled with the large, showy flowers. One of the sights for the visitor to Hawaii is a great mass of these plants, which have been known to put forth as many as 5000 magnificent flowers in a single night.

Not all of the *Cereus* grouping blooms at night, however. Nor are all of them climbers. So among them there is offered a wide choice, ranging from the Rat-tail, with its soft stems drooping over

the edge of the window box, its center a mass of rose blooms, to stout globular forms—or the Sahuaro of the desert, weighing many tons! The *Cereus* group usually has soft, hair-like spines. Those with stiff, needle-like spines have been separated (botanically) from the main group and named *Echinocereus*, the prefix "Echino-" meaning spiny. These are globe-shaped or cylindrical in form, still having the beautiful flower of the *Cereus*. Their fruit looks and tastes much like our common Strawberry, so they have won for themselves the popular name of Strawberry Cactus.

The *Echinocactus* are the familiar Hedgehogs, so named because of the long and stiff spines. Some few of them look so ferocious that they are being renamed *Ferocactus*. All are globular in form, having many ridges, and we like them for their beautifully colored spines. The Golden Ball is a ball of gold in the sunlight; another, with gray spines, is transformed by sprinkling, the gray becoming a beautiful black and crimson. Still another turns crimson and gold. The rings of flowers which circle their tops add yellow, white, pink and magenta.

The Prickly Pear is a native of all parts of the United States. Early settlers cultivated it as a garden delight. In the West it grew so thickly that it was the bane of cattlemen; with the spines removed, however, it furnished food for the cattle. This was done by burning. The botanical group name is *Opuntia*, and here may be found specimens growing close to the ground and also trees fifteen feet high. The large specimens give us the Spanish or Indian Fig, as the golden fruit is known. The smaller *Opuntia* also have a fruit named the Barberry Fig. In some sections the tree forms are used as hedges, and were brought into California by the early missionaries to serve both as protective fencing and as a source of food.

The *Mammillarias* are popular because of their small size, the largest being apparently but six inches tall, the baby in size being a globe but a half inch in diameter. They form in clusters as they grow. They can be recognized by the tubercles into which the ridges are divided, these being very prominent, and the reason for their botanical name. Several hundred individually named specimens are within this grouping, their spines, usually soft and silky, grouped along the tubercles like so many colorful stars. The flowers are large in comparison, some being three inches across and a beautiful deep rose or yellow in color.

The leaf Cacti are the *Epiphyllums* and the *Phyllocactus*. The *Epiphyllums* originally came from below the equator, so we find their



Succulents

Left, "Coffee-berry"; center, Desert Iceplant in full bloom; right, Desert Iceplant

flowering season is during our Winter. Two of these are the well known Easter Cactus and Christmas Cactus, named so because of their flowering time. The flowers of the Phyllocactus, a Spring bloomer, appear at the serrations of the leaves, and are often six inches and more across, brilliant pinks and reds, in form resembling the Hibiscus. These leaf types are practically spineless.

Some oddities will also prove of interest. One is the Old Man Cactus, a cousin of the Cereus, covered from "head to foot" with long, soft, white hair. For our homes we are satisfied with specimens two to six inches high—but in his native sections the Old Man attains a height of twenty feet and more. Another novelty is the Bishop's Cap, the sections plainly marked, each with its row of "buttons," and the flower at the crown serving as ornament. Another spineless one is known as the Dumpling Cactus because of its form. One of the Opuntias is also without spines.

OTHER SUCCULENTS

Many of us remember the old-fashioned garden with its Hen-and-chickens. The "hen" was a rosette of fleshy green leaves, little "chickens" peeping out from underneath—actually new growths from

the parent stem. In many gardens today these Sempervivums are the only member of the succulent group; they form borders along flower beds and lawns and are of low growing and spreading habit.

Another which spreads easily is the Sedum group. Some have variegated leaves and make an attractive cover for rocks and poor soil. The Echeverias might be included here as they are also small, and find use as borders. Among these one has a choice in leaf form, as they can be had with fleshy leaves forming a rosette, tongue-like leaves, and even white ones.

The Aloe is a popular succulent, a member of the Lily family, as is the Yucca. But this latter is hardly a plant for our homes and gardens, although some may like it. We find one of the popular Aloes with orange-red flowers growing on green spikes, slender green leaves waving beside it, looking from a distance like an upturned carrot or a quiet flame. It is ornamental and quick growing. The Aloes are not native to the Americas, coming from the Mediterranean sections, Western Asia and Southern Africa. Plants can be had from a few inches to about 30 feet high. Most of us know the Aloe best as a medicine. It is used in sub-tropic United States as a hedge and for spots of brilliant color in the garden.

There is an American "Aloe" with which we are more familiar, the Agave or Century Plant, called so because of the long period of



Left, the familiar Sedum; center, Hen-and-chickens, the hardy Sempervivum; right, a tree type of Sempervivum

years between bloom times. It has a great rosette of thick, fleshy, often saw-toothed leaves which end in a point, springing from a common root. It often takes 15 or 20 years for it to mature and flower, growing slowly from a plant with leaves a few inches long to the formation of a 15 ft. rosette. Then a tall stem, perhaps 30 ft. in height, springs from the rosette's center; it branches and bears a large number of flowers rich in honey, but once it flowers the entire plant dies. It is widely cultivated because of the beauty of the leaves, some being variegated, yellow and green, others bluish in tone.

If the Agave is too large to fit in with our plans, we can select one in miniature. These are the Haworthias, pretty window or conservatory plants, among which we also have a wide choice.

Some of the succulents grow like miniature trees, with fat triangular leaves. Others of this group are trailing plants. These are the Mesembryanthemums, more easily called Iceplants. They grow in great heat, in the desert or over barren, rocky cliffs. Give them water and see them bloom. The flower of the trailing plant is like the Strawberry, a little larger and a brilliant rose or yellow in color. The tree types have very small blooms in the form of miniature yellow cups. Stems may be red, shading to gray, or yellowish-green and red, the red is always noticeable.

The Gasterias make us think of a plant that has been given a hard squeeze, for its leaves are flattened and grow out in but two directions; sometimes they are spotted. It proves an interesting plant in that it seems to fit in with the Cacti, as also does the Stapelia, when we look at its straight-ridged stem. Stapelias love shade and grow fast. They bloom freely, bearing showy flowers at ground level.

PROPAGATION AND CULTURE

Just as the division of succulents appears different from our more usual garden and house plants, so we find them contrary in their culture. Many have been the unique and valuable plants which have been lost because their owners did not give them the right start—right according to the needs of the succulents.

Cacti and other succulents may be started from seeds, by grafting, or by cuttings. The last is the most popular and easiest way. Many of us accumulate our succulents by the well known method of trading, or the first one which starts us on our collection path may come as a gift, perhaps reaching us from a department store or florist shop.



Planting the seared cuttings in pots of dry loam with plenty of drainage, soil pressed down tightly

Water, except at certain times, is an enemy of the plants of the succulent group, causing a rot to set in that soon grows through the stem, and thereby the plant is lost. Even the water that is contained in the plant's cells must be guarded against when we plant a cutting. So, if we want our cutting to thrive and become a mature plant giving us blooms, we must sear that cut thoroughly, so that no moisture can get either in or out. This may be done by laying the cutting in the sun for a few days, although a better way is to place it on a shelf in a dark closet. A Cactus will need perhaps a week to sear well; other succulents will require a longer time. Do not fear that the plant will die; more likely than not you will bring it forth with roots sprouting! Succulents of all kinds have plant food and moisture stored in the cells of their fleshy bodies.

When the cut is thoroughly seared and entirely healed over, the cutting is ready to be planted. Drainage and plenty of it is essential. Water must not be permitted to gather and remain about the buried portion. Fill the pot one-fourth full with small stones; leafmold may fill the next fourth; then finish with a good loam in which some sand and gravel and a little lime has been mixed. This should all be

dried out thoroughly in the sun before the cutting is planted. Put in the cutting—and do not water! No water should be given the new plant until you are sure new roots have a good start. Then only moisten and do not soak the earth. This may be done by sprinkling, or by placing the pot in water so that the earth will draw it upward from the bottom.

If you become anxious as to whether roots are forming, pull up the cutting and look. Then replant. This will not hurt the young plant; but leave it alone after new roots have started, for it does not like having its roots disturbed. Roots may form in two weeks' time, or within a day or so. The "pulling up" process may even prove of benefit, for if any rot starts there is opportunity to halt it before it goes too far. If necessary, cut off the part that rot has attacked, sear again and replant. It may be that the searing was not thorough the first time.

Cacti and other succulents do not choose their native sand with its lack of water, but they have learned to make the best of conditions as they find them. Nature, always adaptable, has removed the leaves which give off moisture, has given the stems a waxy coating and filled them with cells for the storage of water, so that the plants may live and bloom in such arid sections as we usually find them.

Let us give them better soil, water perhaps once a week, according to their needs, and then see how quickly they show appreciation by producing growth and blooms! Even a little commercial fertilizer can be put in the soil. With a good soil we can crowd the roots, either by putting several in one box or pot, or using a smaller pot than we would ordinarily.

Pots should never be glazed. Use an unglazed, porous pot, decorating it with Indian-like spots and lines in the reds, yellows and blues of the primitives. No moisture must be allowed about the young plant. This is important, although "contrary." And the first three rules are to sear, sear, sear!

Many of the succulents are hardy, although they may be found to originate in a tropical country. Mexico, for instance, is the home of many, but often these plants are found on the high mountains, accustomed to cold and to snow. In northern states where the hardy sorts are grown outdoors, a covering of snow will serve as a blanket to keep them warm and as well will water them for the Spring growth and blossoming. However, no matter what their original source may be, all require this "contrary" treatment at the start.



A desert garden as reproduced in a box 12x18 in., and consisting of miniature Cacti, stones, and a cut-out figure for life-like appearance

In the Spring the plants may be set out, the pots placed in the ground, to be taken up before frost comes. After the flowering period there is an interval of rest, which is the best time to secure your cuttings. If you use seeds, they must be kept well drained, warm, and just a little moist until after they come up. With a cutting a growth is produced in six months equal to what would possibly require six years' time from a seed. Grafting had best be left to experts who are willing to chance the result, although it is often successful.

Specimen Cacti and other succulents may be used as table ornaments, or in groups in the form of table desert garden, also in window boxes. They are clean to have about, require little water except in early Spring, and are so easy to care for that we can go on that trip and forget them—to be greeted with new blooms on our return. Just respect their contrariness which arises from a life in arid lands and use care in starting the plants, and success will be assured.

*For a complete work on the subject of this
chapter we recommend*

OUR NATIVE CACTI, by ETHEL BAILEY HIGGINS
Secure this book where you bought your Garden Guide

Chapter XVII

PLANTS WHICH YIELD HONEY FOR THE BEES

By FRANK C. PELLETT

Farm Crops—Weeds—Garden Flowers—Vegetables—Trees,
Shrubs and Vines

IN the Old World the so-called bee gardens are common. There is much interest in bringing together the plants which are attractive to the honeybees. There is a very long list of plants which are important sources of nectar, but many of those which are most copious in their yield of sweets are undesirable in other ways. Some are noxious weeds and are hardly to be included in a cultivated garden.

FARM CROPS

The gardener who is also a beekeeper will often wish to include as many things as possible which will provide pasture for his bees, even though the area be insufficient to make a great deal of difference in the amount of honey secured. The greater part of the surplus honey which goes to market in the Northeastern States comes from cultivated crops. This is also true in the Middle West and the Rocky Mountain region. The Clovers are the source of a large portion of the total crop. Alsike Clover, White Dutch Clover, Sweet-clover (*Melilotus*), Alfalfa and Crimson Clover are all important farm crops which yield honey. Buckwheat also yields nectar freely in the region of the Great Lakes.

WEEDS

Among the weeds which add something to the wealth of the bees may be mentioned Dandelion, Sow Thistle, Canada Thistle, Mustard and Milkweed. In some cases the Milkweeds may well be included in the ornamental garden, but the others are hardly to be encouraged anywhere.

The reason that most of our honey comes from farm crops and weeds rather than from gardens, is because these plants are present in so much greater numbers. Whole fields of Clover or Buckwheat offer unlimited pasture for the bees. However, the period of bloom for any one plant is usually short and it is desirable to have some-



Some of the garden flowers are rich in nectar

thing for the bees during the entire season. Even though our gardens are too small to offer a large amount of pasture, they may be of substantial help during periods when no major honey plant is yielding. At such times the scattering flowers of many kinds are eagerly sought.

GARDEN FLOWERS

Some of the garden flowers are very rich in nectar. Catnip, which has escaped from the old-fashioned herb gardens and become widely naturalized, is an example. Borage, Chicory and Lavender are other good honey plants of similar origin. Horehound and Motherwort also came from abroad, but although good sources of honey, they are too much inclined to spread as weeds to be desirable to include in the bee garden. Rosemary is a famous bee plant.

Here and there we find someone who revives an old-fashioned herb garden, and a surprising number of the plants included are attractive to the bees. Majoram and Hounds-tongue are bee plants which would be included in such a garden. Nearly all the Mints are good for honey.

Among the purely ornamental flowering plants the Mignonette has received much attention as a bee plant. Much space has been given it in the bee papers and large plots have been planted for the bees. Mere mention of all the important ones would take more space than is here available. Cleome, Globethistle, Thoroughwort, Bachelor Button, Heather, Goldenrod, Giant Hyssop, Gaillardia, Buddleia, Heliotrope, and a host of others from the Scilla, which blooms as soon as the frost is out, to the Dahlia late in Autumn.

VEGETABLES

In passing the vegetable garden, let us mention Asparagus, Melons, Pumpkin, Squash, Cucumber, Onion, Celery and Parsnip, among those which yield nectar freely.

TREES, SHRUBS AND VINES

Among our Northern trees, we must include Linden, Buckeye, Catalpa, Tuliptree, Black Locust and the Maples, all of which are valuable sources of nectar. In warmer places we add Holly, Mango, Orange and other citrus trees, Peppertree and Eucalyptus.

The list of shrubs is a long one. Among them we may select the Indian-currant, Snowberry, the Buckthorns, Barberries, Button-bush, Pea-tree, Cotoneasters, Sumacs and Privets.

Then we must not overlook the many good honey plants among the vines, especially the various species of Ivy. Nearly all the species of Hedera and Ampelopsis are rich in nectar and are swarming with bees during their period of bloom.

In closing, it should be pointed out that the environment in which a plant grows has a great influence upon the nectar which it yields. Some plants are abundant in their nectar flow under some conditions, while yielding very little under others. One must not be surprised if some famous honey plants prove disappointing in a particular garden.

For a complete work on the subject of this chapter we recommend

AMERICAN HONEY PLANTS, by FRANK C. PELLETT. A book of 419 pages and 204 illustrations which goes into intimate detail concerning the honey plants of all parts of the United States and Canada.

Secure this book where you bought your Garden Guide.

Chapter XVIII

PORCH AND WINDOW BOXES

By J. G. BACHER

Construction of the Boxes—Soil Requirements—Plant Material for Box Filling—Special Seasonal Planting

MANY a flower fancier without a garden finds that the window box provides a convenient means by which the beauty of growing plants and flowers may be enjoyed. Whether the porch or the window box is more appropriate depends upon the type of home in which one lives and upon the facilities for placing these boxes. In apartment structures provision is frequently made for placing window boxes in convenient locations for the flower loving tenants, and with the changing types of building construction, the placing of these boxes often influences the appearance of modern homes or apartments immensely. The task of bringing out the full beauty in flowers is then up to the person who undertakes the planting.

CONSTRUCTION OF THE BOXES

Where the boxes are not yet constructed, it is well to give the carpenter or builder a few pointers as to what constitutes a satisfactory box. The available space is, of course, the deciding factor regarding their size and length, but they cannot be made too small, or else they will prove unsatisfactory to growing plants. Cedar, redwood, and fir, considered most resistant to decay, are the best kinds of lumber out of which to make them. Boxes which are exposed to the south or west sun must be properly constructed to guard against warping. The depth of the soil should be not less than 8 in., with 10 in. as the happy medium. The width should be the same, and if it is possible to make the boxes proportionately larger, the maintenance will be much easier and the growth of plant life more normal. It is very essential that drainage be provided by boring holes through the bottom, and the boxes themselves should always have small cleats on the bottom, so that air can circulate below the box and at the same time permit water to escape freely. When boxes are lined with metal in order to insure against



Window boxes used on this backyard garage eliminate the plainness of the structure and add a color note to the cozy garden with its rock pool

decay, the drainage problem is of utmost importance, and must be well taken care of at the time the soil is put in by placing some broken pieces of pots on the bottom to prevent the soil from clogging up the drain openings. The outside of the boxes can be painted to match the building or in some color which will make a pleasing contrast. This helps to bring out the beauty of the flower colors to better advantage. The self-watering metal boxes are a very convenient type to use if sizes to fit the locations can be secured. On the newer style buildings cement or art-stone boxes are often more appropriate than wooden or metal ones.

SOIL REQUIREMENTS

In order to secure satisfactory or exceptional results from window box flowers, it is important that the soil be properly prepared. The plants will be obliged to grow in comparatively crowded quarters, and the soil, therefore, must necessarily be rich in plant food. The simplest

thing for the average amateur to do is to go to the nearest florist and purchase the soil which is best suited to the kind of plants he wishes to grow. Real gardeners know that certain plants prefer certain soils, but that many kinds of flowers will thrive in almost any kind of soil, if moisture and fertilizers are provided in the required amounts. Geraniums, for instance, will grow in practically any kind of soil, but Begonias require a very fine quality soil in order to do their best. If one must prepare his own soil for the boxes, then it is wise to look for rich, loose soil, and mix into it some sand, perhaps, or some peat moss if it is inclined to be mucky or heavy. Old, well rotted manure is, of course, by far the best soil improver, if it is available, but in this present age of automobiles, it is very difficult to secure manure. There are, however, many prepared commercial fertilizers on the market now that can be substituted for manure, and peat moss, although not a fertilizer, is a wonderful help in making soils loose and mellow. One practical pointer which it is well to bear in mind is that boxes facing the hottest



A porch urn planted with trailing and upright Fuchsias



Window box of scarlet Geraniums, Heliotropes, Calceolarias, Nemesis, Trailing Lobelia, Parlor Ivy and Sweet Alyssum

sun should contain heavier soils than boxes with a north exposure. Heavy soils, as a rule, retain moisture far better than loose, sandy soils, and boxes in the full sun are inclined to dry out much more quickly than those in shady locations. Bearing these facts in mind will help to increase one's satisfaction in window box gardening.

When the boxes are filled with soil and planted, there should be enough space left to allow a generous watering without permitting the water to spill over the sides. In this way the soil will settle to some extent, and by the middle of the Summer there will be room enough to apply a top dressing of new, rich soil mixed with fertilizer. This is really one of the secrets of securing continuous vigor in the plants throughout the whole season. If it is not possible to apply such a top dressing for lack of space, then one may simply spread some concentrated fertilizer or plant food over the top and water it in. A high grade flower fertilizer should contain such essential elements as nitrogen 3 per cent, phosphoric acid 7 per cent, and potash 5 per cent. This combination produces well balanced growth and induces free flowering in plants. One can mix such a fertilizer into the soil at the time of filling the boxes at

the rate of a heaping tablespoonful per square foot of box, and add to it also two tablespoonfuls of bonemeal at the same time. By mixing it carefully with the soil the plants will soon be remarkably stimulated in their growth, which will be shown by their well colored foliage. It is understood that immediately after planting, the boxes must be well watered. The use of ammonium sulphate or nitrate of soda in a solution cannot be recommended for boxes containing flowering plants, as it reduces their flowering ability, but it is excellent for foliage plants, as it stimulates the growth of the leaves. Generally, it is best to wait with the application of nitrate of soda until the boxes have made a good start—about a month or six weeks after planting them. The root systems are then well established and can assimilate the fertilizers at once. The watering of newly planted boxes must not be overdone until the root systems are well established. The question as to whether it is better to water in the morning or evening may best be answered by stating that if the nights are chilly, it should be done in the morning, but otherwise evening watering is preferable.

PLANT MATERIAL FOR BOX FILLING

It is usually well for the average amateur to consult his nearest florist or greenhouse man for advice before filling his porch or window boxes. Let us presume, however, that we wish to make our own choice of plants, or to carry out some special color scheme of our own. We proceed, therefore, to make out our list of the plants desired. There are many factors which must be considered when the selection of plants is made. First, we shall consider the best kinds to use in boxes that are facing the hottest sun, either with a southern or a western exposure. The following are the most suitable for either of these exposures:

At the head of the list we have Geraniums in their great number of varieties and colors. They are especially satisfactory plants to use, as they stand the hot sun well and are able to thrive even when the watering is occasionally overlooked. As a matter of fact, Geraniums bloom more profusely and remain more compact if not watered too much. The choice of colors should be guided somewhat by the color of the building itself, so that the completed planting will be in harmony with its background. In order to secure the most satisfactory color effects, it is best to have the color of the Geranium represent the color which is to predominate throughout the box, and then to choose the other plants in the complementary or secondary shades. For instance, let us presume that we wish to carry out a red, white, and

blue color scheme. The S. A. Nutt Geranium would provide the red, the Felicia amelloides (*Agathea coelestis*), also known as the Blue Marguerite, the blue, and the double flowering Sweet Alyssum the white. The so-called blue Marguerite, or Felicia, is especially well adapted to boxes in sunny locations, as it can stand heat very well and has the same preference as the Geranium for modest watering. Its graceful, blue flowers are long lasting, and they make very good cut flowers as well. The Ageratum is a much used blue flower for box planting, but it greatly resents root crowding and dryness. It blooms very profusely, however, when its particular requirements are satisfactorily met. Geraniums used by themselves with just some trailing plants to hang over the sides of the boxes will very often make a better showing than mixed plantings which grow into junglelike masses. The location or placement of many boxes calls for the use of vines or trailing plants, which, however, will be discussed later on in a group by themselves, with the exception of the Ivy Geranium, which we shall consider now. In some of the cooler regions of our country, such as the coast sections, they are unexcelled as handsome trailing plants for boxes, and when used exclusively they produce superb effects. Although they will grow in almost all parts of the country, they will not always flower with the same freedom as they do in the coast regions.



Window box of assorted Petunias, Heliotropes, Geraniums and Sweet Alyssum in a color combination of royal purple, pink, lavender and white

In regions where the atmosphere is warm and humid, such plants as the Lantanas, Coleus, Impatiens, Vincas, Heliotropes, Begonias, etc. should be used, for they prefer and will thrive under such conditions.

A plant of exceptional value and adaptability to window box planting is the Petunia, for its habit of growth is such that it produces some extremely handsome effects. Here, again, one can secure the finest results by a mass planting using just one color; or by featuring a dominant color through the use of a contrasting variety, as, for example in planting a box requiring six plants, one chooses five of the Pride of Portland variety, a large, single, fringed, rose colored sort, and one of the Elk's Pride, which is a deep velvety purple, nearly black. The effect of such a combination will far exceed in beauty of color a mixture of many colors. One must use judgment, however, when choosing a particular variety of Petunia to use alone in a mass planting. The beautiful Elk's Pride variety, for instance, when used by itself produces a rather gloomy effect because of the darkness of its color. People who favor the calico color ideas, where everything is mixed, will find the mixed strains of Petunias simply unexcelled for mass blooming in a box by themselves, or in a mixed planting among other plants.

For warm regions and in full sun the Lantanas are beautiful in their attractive colors of yellow, orange, pink, and white, and they bloom very freely and continuously under proper conditions. A fine companion plant to the Lantana is the Streptosolen amabilis, which produces small violet colored flowers with white dots in their centers, and blooms in great profusion throughout the whole Summer season. Browallia, which resembles the Streptosolen, is also often used, but it does not make as attractive a showing. Phlox drummondii in many sections of the country is unsurpassed as a plant for window box use, as it comes in many rich colors of utmost brilliance, and flowers freely all season. It can be procured in separate colors, or in mixtures, shading from pure white to deepest red.

The types of flowers to be used (that is, whether large or small flowers) are often influenced by the location of the box. One location may call for the use of large flowered plants, while another may require the use of small flowered types, but when mixed plantings are made the two should usually be combined in order to secure the most beauty and grace.

The successful planting of boxes in partial shade involves the use of plants which favor shelter from the hot sun. There are many plants of course, that will grow in sun and shade both, but which usually show

a decided preference for one or the other. Begonias are usually far more handsome when planted where the morning sun only can reach them, and of the same disposition are the Heliotrope, Fuchsia, Calceolaria, and Nemesia. Even Coleus, those attractive foliage plants, will become more beautifully colored if not planted in too hot a location. Vines, or trailing plants, such as Vinca, Kenilworth-ivy, Glechoma, Parlor Ivy, and English Ivy prove very satisfactory in partial shade, or even in full shade.

When planting a box which is to be in the full shade, one must choose the material with great care, for the number of plants which will thrive in complete shade is rather limited. Beautiful effects, however, may be secured by the use of ferns and foliage plants, which do not require sun. Maidenhair fern in its varieties, Nephrolepis or Boston Ferns, Pteris or Brake, and many others can be used with great satisfaction if care is taken never to allow the soil to become dried out at any time. Once well started, a good box of ferns is a thing of beauty, admired by all. Such plants as *Asparagus sprengeri*, *Grevillea robusta*, *Dracaena indivisa*, *Ficus* or Rubber plants, and *Pandanus veitchi* in small specimens, serve splendidly for box filling in partial shade. Boxes filled with plants of this nature must not be put out until the weather has become warm. It is well to consult your florist in this matter for advice as to the available material and the proper time of planting in your particular section of the country.

When choosing the plants for filling the boxes, it is quite important to select suitable vines to trail over the box proper, for trailing plants will take away any stiffness in the appearance of the whole, which may otherwise be too evident. A selection of very useful vines can be made from the following list. Flowering vines are the double white Sweet Alyssum; trailing Lobelia, in the dark blue, or in the variety Sapphire which has larger, light blue flowers with white centers, by far the finest variety for the purpose; *Thunbergia alata*, called the Black-eyed Clockvine because of its neat, round, light or dark yellow or white flowers with black centers, and which is one of the finest vines for sunny locations, flowering freely all season long; *Maurandia*, with pink to lavender flowers, which is to be recommended for its free growth and gracefulness; *Cobaea scandens*, which produces large, bell-shaped flowers toward Fall, and is best used in large boxes and in those which are located at a height which requires long trailers, under which circumstances it will prove quite satisfactory and elegant. The Vinca



Porch box of Periwinkle, Geraniums, Phlox, Verbenas, Boston Fern, Coleus, Petunias and German Ivy

vine with its variegated foliage is a favorite in general use. Vinca minor, however, often known as the hardy Periwinkle, with its small, dark green foliage, is also worthy of consideration, especially for shady situations. In some of the milder regions it retains its neatness and beauty all Winter long, for its hardiness is well known. It is sometimes used as a permanent vine, and in early Spring is covered with neat, blue flowers. *Lysimachia nummularia* is also a very fine vine for boxes in shady situations, and when properly established becomes covered with small, yellow flowers in great profusion. The so-called German or Parlor Ivy with its quick growth of bright green foliage is much used in box planting, but very often to the disadvantage of the flowering plants, as it grows too rank and chokes them if not held in check by frequent pruning. The same condition frequently occurs when Kenilworth-ivy is used, although its foliage is much more refined and neat. Boxes facing east or north, where the sun is not too strong, may very successfully be planted with trailing Nasturtiums alone, if the location and space will permit the profuse growth that this plant makes under favorable conditions. Mixing it with other plants is not advisable, as the Nasturtium foliage would crowd out its competitors. In order to

secure the quickest results with Nasturtiums, it is best to have them started in a greenhouse in small pots, and then to plant them out into the boxes when they are well under way and all danger of frost is over. They must be given ample space, at least 8 in. apart in the box. Mixed colors may be planted, but it is better to use one good variety by itself, as a mass of one color is more effective than a mixture. One must guard against watering Nasturtiums too generously, for this brings about an over-luxurious growth in the foliage and retards their flowering considerably.

Good judgment and care in watering window and porch boxes determines, to a great extent, the degree of one's success with the boxes, and a little extra diligence in this task will often bring rewards far beyond expectations. In the early stages of the planting the roots of the plants have ample room and do not absorb the moisture as quickly as they do when the boxes become crowded. Water freely when necessary, and as often as needed, but avoid all excess. In sunny, hot locations it is well to place a mulch of peat moss and sand over the surface of the boxes to prevent too rapid evaporation of the moisture.

SPECIAL SEASONAL PLANTING

Now, a word as to seasonal effects in window box plantings, for the previous notes all have applied to Summer effects. Very often it is of greater merit to have attractive window or porch boxes during the Winter or early Spring months than during the Summer, as they are more unusual and appealing at that time when gardens are bare and do not compete with them. What to plant into the Winter boxes is a problem which is controlled by the climate of each particular region. Even the coldest sections of our country will permit Winter window box planting, for in the group of Conifers there are some extremely hardy evergreens fit for this purpose. By going to your nearest nurseryman who specializes in small evergreens, you may secure from him such neat specimens as will make very handsome boxes. As each region has its own particular plants that are fit for its climate, it is best to leave it to the judgment of the nurseryman to select the proper and suitable plants. Spruces, such as the Norway and Colorado forms, may be used to good advantage in the coldest sections. Many Pines, also, are practical and neat in appearance, as are the Junipers that are available in fine assortments in the better nurseries. These can all be secured from nurseries specializing in Conifers, which are located in

almost every state of the Union. The planting of small evergreens in boxes should be done immediately after the Summer flowers are eliminated by frosts. The balls of earth with which the young trees are provided should not be disturbed when planted, and the surface of each box should be covered with a layer of peat moss, which will prevent the rain from splashing the soil onto walls or windows during storms.

In the milder regions, such as the coast section of the Pacific Northwest, California, and the Southern States, one may indulge in the use of broadleaf evergreens in addition to Conifers. *Aucuba* in its varieties, *Euonymus*, *Camellias*, evergreen *Azaleas*, *Laurustinus*, *Choisya*, and many others in this group provide a rich selection for box planting. The *Erica mediterranea* hybrid, which starts flowering in October and continues all through the Winter months with its masses of rose-colored flowers, is a marvelous subject for this purpose, and of equal merit,



A Winter window box

but greater novelty, is the *Pernettya mucronata* with its masses of berries in different colors that last all Winter in the coast regions of the Pacific Northwest and California. Boxwood is frequently used, and might prove hardy in many states of the Union. During cold weather its normal green color turns to a ruddy bronze, except in shady situations. It is generally the best policy to use only one type of evergreen shrub all by itself, as mixtures seldom blend or produce satisfactory results.

Now, regarding planting the boxes for early Spring displays, in those regions where Winter planting is not possible or advisable, one can take advantage of the opportunity to have colorful boxes early in the Spring by the use of well grown clumps of the hardy *Primula veris* or garden Primroses in their many colors, and in this way have color around the building even though there still are occasional frosty nights. One can also use for this purpose the *Aubrietia* and *Arabis*, both very early flowering and delightful plants for box planting, but they must be strong plants and set out with as little root disturbance as possible. In coast regions where the temperature in some sections remains for a long time between 40 and 50 degrees, two excellent florists' plants will give fine results while the weather is still too chilly for ordinary flowering plants outdoors. One of these is the *Primula malacoides* and its new varieties which are now being widely grown throughout the country by greenhouse men. This *Primula* enjoys the chilly air and can stand light frosts with but little damage, if any. Unfortunately, its robust nature is as yet but little known, and few greenhouse men really grow them cool enough; yet, in the writer's garden they were left out over Winter several times with snow as their only protection, and then came up again as self-sown plants during the earliest Spring days. The *Cineraria hybrida* is the other plant of great beauty that loves a cool atmosphere, but it will not tolerate frost. It has, however, proven a most satisfactory window box plant during the cool Spring season, and as its colors are so richly varied and its flowering season extends over a period of three months outdoors, it makes one of the best plants for this purpose in all the cool regions of our country where severe night frosts are not to be feared. However, it is necessary that those *Cineraria* plants which are destined for outdoor use should be grown cool and well ventilated, for those that are grown in warm, stuffy greenhouses become too tender and fragile to resist wind and weather outdoors. Properly grown, they are very robust, and when planted in the open soil and watered only as needed, they will bloom beautifully



Two simple but effective window boxes filled with Marguerites, Variegated Vinca and Ivy

and will last so long that they will be a surprise to everyone. They prefer a rich, rather heavy soil in order to do their best. The dwarf, compact growing types are much to be preferred over the tall forms. Also, the smaller or multiflora form is better than the large flowering varieties, which are more easily damaged by rain and wind. The *Cinerarias* should be planted outside when they are just starting to bloom, and when heavy frosts are no longer to be feared. Water them when necessary but not excessively, as during the cool weather their requirements are limited and start to increase only when the weather gets warmer.

In many regions with temperate climates Wallflowers can be used with great satisfaction as window box plants, and it is a truly pleasing sight to see boxes full of rich brown to orange colored, delightfully fragrant Wallflowers in full bloom. A combination planting of Forget-me-nots and Wallflowers will produce an almost fairylike effect, as they bloom at the same time in an unexcelled color harmony, and they have the same soil preferences, both requiring a rich, but heavy soil. The Wallflowers should be grown in pots previous to planting out, as they resent any root disturbance which is otherwise necessitated. In the colder regions the Wallflowers may have to be grown under glass

during the most severe part of the Winter, but can then be planted out in the early Spring along with the Forget-me-nots. Their flowering period lasts for several weeks.

Many of the profuse growing rock plants, such as Arabis, Aubrietias, Iberis sempervirens or Evergreen Candytuft, Lithospermum fruticosum or Shrubby Gromwell, and Helianthemums or Sunroses, also make very fine window and porch box plants. Primula acaulis is for eastern or northern exposures, and if set out in strong, well grown clumps, will make a glorious display, for they flower very early and over a long period of time, but must not be exposed to the afternoon sun as they are happiest in partial shade. It is important, however, to use only large, well grown clumps of them, and to plant them just as soon as the frost is out of the ground so that they can be lifted while still dormant. After they are through flowering, they can be set back into a garden border or bed to grow there for another season, as may all rockery plants used in a similar manner.

Those who dwell in city homes or apartments, where the beauty of Fall flowers is but little seen, may greatly increase the enjoyment of window boxes by a Fall planting of the dwarf sorts of Pompon Chrysanthemums. This can readily be done after the Summer flowers have completed their display. The problem is simply to inquire of your florist for information on the available plants, and if he is not able to furnish suitable stock for the purpose, he may direct you to some specialist in hardy Chrysanthemums who can provide you with many sorts that are dependable for window box planting. These hardy sorts may be purchased in outdoor grown clumps and transplanted carefully so that they come with a perfect crop of flowers. There are many suitable varieties in all colors, and it is best to choose the one most suited to the particular color of your building. The beautiful late Fall season often experienced makes a display of Chrysanthemums very entrancing in window boxes, and it is surprising how well the flowers last in this way. Beyond an occasional watering after planting, there is hardly any care involved, unless a severe frost should threaten, in which case it is a simple task to put some bamboo stakes among the plants, allowing the stakes to protrude above the plants so that newspapers can be held in place to provide a covering. This is a very simple method of prolonging a floral effect clear into the Winter season.

Chapter XIX

THE VEGETABLE GARDEN

By PROF. ALBERT E. WILKINSON

WHY A VEGETABLE GARDEN?

THERE are at least four reasons why one should have a vegetable garden. First, the freshest vegetables can be obtained therefrom; second, it is possible to save money through possession of a good garden; third, there is the love for working in the soil and seeing things grow; fourth, there is the benefit to be obtained from exercise in such a garden.

Only those who have had the joy of eating Sweet Corn picked thirty minutes before being served know exactly the taste of good Corn. Green Peas, freshly picked, are far more delicious than those purchased and which may be from one to four days old.



An Amateur's Vegetable Garden
All the space utilized and everything growing luxuriantly



Lettuce, Beets, Onions, Carrots, Peas and wire netting support for Peas.
This garden is a model of good keeping

How much one can save depends so much on the ability and the thoroughness of the particular grower and the size of his garden. But money, in the eyes of many gardeners is by no means the only criterion of success or benefit, for the great majority of us love the soil and take delight in working therein and seeing things grow. And, lastly, there is this thing known as exercise—exercise which yields something visible. A garden lover can play golf or tennis or other sports, and he will have obtained exercise, and either a game well won or a game lost, but there does not follow something tangible as a result.

The decision whether one shall have a vegetable or flower garden, or both, depends largely upon the amount of ground available and the inclination of the individual. The locality also has some influence. A shut-in city plot does not make a satisfactory vegetable garden, and one heavily shaded by trees is more or less hopeless. Vegetables need air and sunlight to a greater degree than most ornamental plants.

PLANNING

To ensure a successful vegetable garden it is desirable to have a recorded plan before commencing. First measure the space available and with ruler and pencil, draw lines on paper for every foot measured to represent the area, each line one-quarter inch apart to represent every foot. If the paper is large enough, one-half inch apart will be better. Make the lines each way so that the whole is a series of small squares. No matter what shape the garden may be, it can be represented on paper.

The plan made, the next thing is to decide what varieties of vegetables are to be grown. This is purely a personal matter, or at least, the gardener will be governed largely by the desires of his family. The list made, he can allocate the various items to the plan as suggested in the accompanying diagrams. (Plans I, II and III, shown on pages 267, 268 and 269 respectively).

25'			
Plant April 1-20	Peas	1'	
Plant April 1-20	Peas	2'	
Plant April 1-20	Spinach	2'	
Plant April 1-20	Beets	2'	
Plant April 1-20	Onion Sets	2'	
Plant April 1-20	Radish (1/2 row)	Lettuce (1/2 row)	2'
Plant April 1-20		Carrots	2'
Plant April 1-20		Peas	2'
Plant April 1-20		Peas	2'
Plant April 1-20	Swiss Chard (1/2 row)	Cabbage (use plants) (1/2 row)	2'
Plant May 1-10		Beans, Wax	2'
Plant May 1-10		Beans, Green	2'
Plant May 15-25		Beans, Lima	2'
Plant June 1-5		Tomatoes (use plants)	2'
Plant June 1-5	Eggplant (1/2 row) or Cabbage (use plants)	Peppers (1/2 row)	2'
Plant June 1-5		Beans, Wax	2'
Plant June 1-5		Beans, Green	2'
			2'
Plant June 1-5		Cucumbers	2'
			2'
			1'

PLAN I—SIMPLE VEGETABLE GARDEN 25'x40'

25'	
Follow Peas with Beets	1'
Follow Peas with Carrots	2'
Follow Spinach with Rutabaga Turnips	2'
	2'
Follow Onion Sets with Spinach	2'
Follow Lettuce with Celery	2'
Follow Carrots with Spinach	2'
Follow Peas with Cauliflower plants	2'
Follow Peas with Cabbage plants	2'
	2'
Follow Beans (Wax) with Lettuce	2'
Follow Beans (Green) with Spinach	2'
	2'
	2'
	2'
	2'
	2'
	2'
	2'
	2'
	1'

PLAN II—SUCCESSION CROPS TO BE USED IN PLAN I

Plan I is for a simple garden 25 ft. wide and 40 ft. long. The plantings have been arranged so that those coming early (say in April), such as Peas, Spinach, Lettuce, Beets, and so on, can be planted at approximately the same time or day. This would take up the first part of a garden; the second date of planting follows immediately, utilizing this space, and the third and other plantings follow. The space between the rows in this garden is practically uniform, about 2 ft. apart. This is, as stated before, a simple garden for one not particularly well versed in garden lore, and should be used only as a guide to help a gardener work out his or her own garden plan.

Plan II is the same as Plan I, plus a few crops that may be used after the first have been harvested; that is, succession crops. Other crops could be selected and used with Plan I or with any other plan that may be drawn. Plan III includes vegetables shown in Plans I and II with others that may be grown as companion

crops. These plans are offered only as suggestions. The garden is so small that several plantings of any one vegetable are not possible. In larger gardens several plantings of any vegetable could be made; that is, eight or ten plantings of Sweet Corn, six or seven of Spinach, three or four of Beans, Peas, Tomatoes, or any other item that does not require the whole season. A larger garden also offers possibilities for greater areas of any one crop at one time, or larger crops, such as Squashes, Melons, and so on, and it may also include many of the permanent varieties; that is, a row or two of Asparagus, a few hills of Rhubarb, a row or two of cultivated Dande-

25'		
Plant April 1-20	Peas	1'
Plant May 30-June 10	Sweet Corn	1'
Plant April 1-20	Peas	1'
Plant May 30-June 10	Sweet Corn	1'
	Spinach	1'
	Beets	2'
Plant May 30-June 10	Onion Sets	2'
Plant May 30-June 10	Radish (1/2 row)	Lettuce (1/2 row) 2'
Plant May 30-June 10	Carrots	2'
	(2nd planting) Sweet Corn	1'
	Peas	1'
	(2nd planting) Sweet Corn	1'
	Peas	1'
	(2nd planting) Sweet Corn	1'
Swiss Chard (1/2 row)	(use plants) Cabbage (1/2 row)	1'
	Beans, Wax	2'
	Beans, Green	2'
	Beans, Lima	2'
	Spinach, Early	1'
	(use plants) Tomatoes	1'
	Radish, Early	1'
Use plants (1/2 row)	Eggplant or Cabbage	Peppers (1/2 row) 1'
	Beans, Wax	2'
	Beans, Green	2'
	Spinach	2'
	Cucumbers	2'
	Radish	2'
		1'

PLAN III—COMPANION CROPPING (CROPS FROM PLANS I AND II INCLUDED)

lions, Horseradish and herbs, as well as Strawberries, Raspberries, Blackberries, Gooseberries and Currants. With a larger garden, too, greater space can be given between rows than mentioned, thus permitting horse culture instead of hand culture.

The plan of one year may be used the next year, provided one changes the location of the crops. In other words, there should be rotation of crops each year. The reason for this is due to the fact that the various troubles, particularly diseases, are carried over in the soil, and by rotating it may help to keep trouble away or lessen it. Also, certain crops are better adapted to follow other crops. This may be due to the exhaustion of the soil through a single fertilizing element, or a condition of the soil which just fits the particular variety.

In planning it is important to consider the tools, as well as the various supplies that are necessary. In a simple garden, such as the one 25 by 40 ft., a spading fork, rake, hoe, trowel and a garden line are the only tools necessary. For larger gardens, one can generally hire someone to do the plowing. Of course, there is no objection to hand spading if real vigorous exercise is desired or one has the time. In addition to the tools needed for a small garden, the larger garden would benefit by having a wheel cultivator and perhaps a seeder. All of these tools, if properly cared for, will last for a great number of years.

Manures of some kind are essential in the vegetable garden, and while farm or stable manures are highly valuable because of their organic character, they are unfortunately not easily obtained in suburban areas, or at least they are costly. However, if one has a large garden, it is possible to reserve a portion of it each year for a crop of rye to be dug or plowed in while green. This will provide organic matter and with commercial fertilizers in addition, excellent results may be secured. A good general fertilizer will contain 5 per cent nitrogen, 8 per cent phosphoric acid and 5 per cent potash; this is commonly known as a 5-8-5 fertilizer. Some mixtures may contain a higher percentage of one item and less of another, but the figures always indicate the same elements. Commercial organic fertilizers, especially useful in small gardens are: Driconure, containing cow manure and peat moss; dried sheep manure, dried cattle manure, and tankage, the latter dried material from cattle yards and slaughter houses. Dried poultry manure is a strong nitrogenous fertilizer and other powerful stimulants for seasonal use are nitrate of soda, Nitrophoska, Ammo-Phos, and sundry other materials handled by regular dealers.

Spray materials and spray equipment are also necessary. For the small garden perhaps dusting is more practical. A small duster costs about a dollar and some calcium lime dust and bordeaux lime dust, with perhaps a limited amount of nicotine dust, should fill the particular needs of the garden. However, fuller particulars may be found in the chapter devoted to insect pests and diseases.

LOCATION FOR A GARDEN

On the small home lot in the rural town or in the city the location of the garden is more or less fixed and offers little choice, but it may be said that the ideal site should consist of a heavy, sandy loam which does not dry out too quickly and is not exposed to strong prevailing winds which may injure crops.

Well drained soil allows no surplus water to remain long on the surface. If it does, raised beds may prove helpful, but a better plan is to lay draining tiles a foot or so below the surface to drain off the surplus water at the lowest point. Very heavy or clayey soil can be lightened with rotted manure, sand, coal ashes and any decayed vegetable matter. Lime, too, does much to sweeten and lighten soil.



Small vegetable garden on suburban lot, with neat wire fence on left and wooden pathway

PLANTING TABLE FOR PLACES

Early dates should be used farther South and later dates farther North. Adapt table to your

Name of Vegetable	Seed for 100 ft.	Time to plant seeds			Depth to plant seed (inches)
		Hot-beds	Cold-frames	Open ground	
Artichokes, Globe.....	1 oz.	Mar.	Apr.	May	1/2
Asparagus.....	120 to 130 plts.	...	.....	Apr.	.....
Beans, dwarf.....	1 pt.	Mar.	Apr.	May to July	1
Beans, pole.....	1/2 pt.	Mar.	Apr.	May or June	1
Brussels Sprouts.....	1/4 oz.	Mar.	Apr.	May or June	1/2
Beets.....	2 ozs.	Mar.	Apr.	May to Aug.	1/2 to 1
Cabbage, early.....	1/4 oz.	Mar.	.....	Apr., May	1/2
Cabbage, midseason.....	1/4 oz.	...	Apr.	May	1/2
Cabbage, late.....	1/4 oz.	...	May	June	1/2
Carrots.....	1 oz.	Mar.	Apr.	May, June	1/4 to 1/2
Cauliflower.....	1/4 oz.	Apr.	May	May, June	1/2
Celery, early.....	1/4 oz.	Mar.	.....	Apr.	1/4 or less
Celery, late.....	1/4 oz.	Mar.	Apr.	May	1/4 or less
Corn, early.....	1/4 pt.	Apr.	Apr.	May	1 to 1 1/2
Corn, late.....	1/4 pt.	...	.....	May, June	1 to 1 1/2
Cucumbers.....	1/2 oz.	Mar.	Apr.	May, June	1/2 to 1
Dandelion.....	1/4 oz.	...	Apr. to Aug.	May	1/2
Endive.....	1 oz.	Mar.	Apr.	June to Aug.	1/2
Kale.....	1/4 oz.	...	Apr.	June to Aug.	1/2
Kohlrabi.....	1/4 oz.	Apr.	Apr.	May to July	1/2
Leek.....	1/2 oz.	Apr.	May	May, June	1/2
Lettuce.....	1/2 oz.	Mar.	Apr. on	Apr. to Aug.	1/2
Muskmelons.....	1/2 oz.	Apr.	Apr.	May, June	1/2 to 1
Onions.....	1 oz.	Mar.	Apr.	Apr., May	1/2
Parsnips.....	1/2 oz.	...	Apr.	Apr., May	1/4 to 1/2
Parsley.....	1/4 oz.	Mar.	Mar.	Apr., May	1/4 to 1/2
Peas, early.....	1 qt.	...	Apr.	Apr.	1 to 2
Peas, late.....	1 qt.	...	.....	May, June	1 to 2
Peppers.....	1/8 oz.	Mar.	Apr.	June	1/2
Potatoes, early.....	5 to 8 lbs.	...	Apr.	Apr.	3 to 5
Potatoes, late.....	5 to 8 lbs.	...	.....	May, June	3 to 5
Pumpkins.....	1/2 oz.	...	Apr.	May, June	1 to 1 1/2
Radishes.....	1 oz.	Mar.	Apr.	Apr. to Sept.	1/2
Salsify.....	1 oz.	...	Apr.	May	1/2 to 1
Spinach.....	1 oz.	Mar.	Apr.	Apr., May, Aug.	1/2
Squash.....	1/2 oz.	Apr.	Apr.	May, June	1 to 1 1/2
Tomatoes.....	1/8 oz.	Mar.	Apr.	June	1/4 to 1/2
Turnips, early.....	1/4 oz.	...	.....	Apr., May	1/2
Turnips, late (Rutabaga)...	1/4 oz.	...	.....	June, July	1/2

NEAR NEW YORK CITY

eds by keeping your own records of what to do and when. Use this table as a guide.

Time to Transplant	Distance apart of rows		Distance apart of plants in rows	Ready for use after planting Days (except as otherwise noted)	Approximate yield per 100 ft.
	Horse culture	Hand culture			
May	3 to 4 ft.	2 to 3 ft.	2 to 3 ft.	15 months	10 to 20 buds
Apr.	3 to 5 ft.		9 to 10 in.	1 to 2 years	75 lbs. up
June	30 to 36 in.	18 to 24 in.	3 to 4 in.	45 to 65	1/2 to 1 bu.
June	3 to 4 ft.	2 to 3 ft.	3 to 4 in.	50 to 80	3/4 to 1 1/2 bu.
May, June	24 to 36 in.	12 to 18 in.	2 to 3 ft.	50 to 85	120 to 150 qts.
May	30 to 36 in.	18 to 24 in.	2 to 8 in.	95 to 120	10 qts.
Apr., May	30 to 36 in.	18 to 24 in.	12 to 18 in.	90 to 100	120 to 150 lbs.
May, June	30 to 36 in.	24 to 30 in.	16 to 24 in.	100 to 120	120 to 150 lbs.
June, July	36 to 42 in.	30 to 36 in.	20 to 30 in.	100 to 130	120 to 150 lbs.
.....	24 to 30 in.	12 in.	2 to 3 in.	75 to 110	1 to 1 1/2 bu.
May, June	30 to 36 in.	18 to 24 in.	14 to 18 in.	100 to 130	15 to 20 heads
Apr.	3 to 6 ft.	18 to 24 in.	3 to 5 in.	120 to 130	200 plants
May, June	4 to 6 ft.	24 to 42 in.	4 to 8 in.	130 to 150	200 plants
May	30 to 36 in.	18 to 24 in.	Hills 18 to 24 in.	65 to 90	12 to 13 doz.
.....	36 to 42 in.	30 to 36 in.	Hills 30 to 36 in.	75 to 100	12 to 13 doz.
May	4 to 6 ft.	4 ft.	Hills 4 ft.	60 to 80	10 doz.
.....	24 to 30 in.	12 to 18 in.	12 to 18 in.	6 to 12 months	3 to 4 bu.
Apr.	24 to 30 in.	12 to 18 in.	12 to 18 in.	90 to 130	3 to 4 bu.
May	24 to 30 in.	18 in.	18 in.	90 to 120	5 to 6 bu.
May	30 to 36 in.	12 in.	12 to 18 in.	60 to 80	100 roots
May, June	24 to 30 in.	6 to 12 in.	4 to 8 in.	120 to 180	200 roots
May on	24 to 30 in.	10 to 20 in.	Head 10 in.	60 to 90	60 to 100 plants
May	6 to 8 ft.	6 ft.	Hills 6 ft.	120 to 150	60 to 80 plants
Apr., May	24 to 30 in.	1 ft.	2 in.	130 to 150	2 to 3 bu.
.....	24 to 30 in.	12 to 18 in.	3 to 6 in.	90 to 120	1 to 2 bu.
Apr., May	30 to 36 in.	12 to 18 in.	3 to 4 in.	125 to 160	2 to 3 bu.
.....	3 to 4 ft.	18 to 24 in.	Close	40 to 80	1 to 2 bu.
Apr.	4 to 5 ft.	24 to 36 in.	Close	65 to 90	1 to 2 bu.
May, June	30 to 36 in.	12 to 18 in.	15 to 18 in.	100 to 140	10 doz.
.....	30 to 36 in.	24 to 30 in.	9 to 12 in.	80 to 100	1 to 2 bu.
.....	36 to 42 in.	30 to 36 in.	12 to 18 in.	100 to 140	1 to 2 bu.
.....	8 to 12 ft.	8 ft.	Hills 8 ft.	100 to 140	25 to 30 fruits
.....	24 to 30 in.	8 to 12 in.	1 in.	20 to 40	75 bunches.
.....	30 to 36 in.	12 to 18 in.	4 to 6 in.	120 to 180	30 to 40 bches.
.....	30 to 36 in.	12 to 18 in.	3 to 4 in.	30 to 60	1 to 1 1/2 bu.
May, June	3 to 10 ft.	3 to 8 ft.	Hills 3 to 8 ft.	Bush 60 to 80	40 to 50 fruits
June, July	3 to 5 ft.	18 to 36 in.	1 1/2 to 3 ft.	Running 120 to 160	20 to 60 lbs.
.....	3 ft.	18 to 28 in.	4 in.	60 to 70	1 1/2 to 2 bu.
.....	3 ft.	18 to 28 in.	7 to 10 in.	98 to 100	1 1/2 to 4 bu.

SOIL PREPARATION

In preparing the soil, it should be realized that the deeper it is spaded or plowed, the better the results. Turning over the soil to a depth of 3 to 4 in. is not sufficient. Plow or spade the soil 9 to 12 in. deep or deeper, and at the same time incorporate humus-making material. This is best done before Winter and in the Spring; it can be fined down with harrow and rake. Stones and other material which would interfere with future cultivation should be removed.

FERTILIZING-LIMING

As previously mentioned, manures of some kind are essential. Rotted stable manures are to be preferred. In a garden 25 by 100 ft. two loads could be used satisfactorily. In addition, this area could take 100 lbs. of good Potato fertilizer broadcasted and worked in just previous to planting.

Some crops require lime in large amounts, especially Cauliflower, Muskmelon, Martynia, Broccoli, Parsnip, Asparagus, Onion, Beet, Leek, Celery, Spinach and Lettuce.

Vegetables requiring a moderate amount of lime are: Carrots, Kale, Tomatoes, Cucumbers, Peppers, Cabbage, Pumpkins and Peas.

Vegetables only slightly responsive to lime are: Corn, Rhubarb, Endive, Kohlrabi, Brussels Sprouts, Dandelion and Beans.

Vegetables requiring no lime (in fact, are injured if lime is supplied) are: Watermelon, Squash, Turnip, Radish, Potato, Parsley and small fruits.

Under average conditions, the following amount of lime is recommended:

For vegetables highly sensitive: 1 lb. of finely ground limestone for each 10 sq. ft. or 8 ozs. of hydrated lime.

For vegetables moderately sensitive: $\frac{3}{4}$ lb. of finely ground limestone or its equivalent for each 10 sq. ft.

For vegetables slightly sensitive: $\frac{1}{4}$ to $\frac{1}{2}$ lb. of finely ground limestone or its equivalent for each 10 sq. ft.

Be sure not to plant the non-sensitive vegetables on land limed the previous year.

DOES IT PAY TO GROW ONE'S OWN PLANTS?

Yes and no. Yes, if the gardener is experienced or if the garden is of large size. No, if the garden is small and the plant needs few, or if

the gardener is inexperienced. The raising of certain plants that are set out later, requires considerable knowledge and practice, as well as a greenhouse or frame. A commercial grower, well equipped, is probably in a better position to grow good plants than an amateur with limited experience and limited equipment.

Most plants offered for sale are in wooden boxes, called flats, but Tomatoes, Peppers, etc., grown in pots or in paper holders will probably give greater satisfaction than plants grown close together in a bed or flat. Such plants are, of course, worth more money but the results should be so far superior to weak, inferior plants that the question of a few cents more should be considered.

To raise one's own plants shallow boxes or flats are desirable. If filled with good garden soil and the boxes can be placed in a sunny window, the careful gardener who gives attention to daily watering and ventilating, may successfully raise a limited number of seedlings.

For larger quantities, a small greenhouse or at least one or more frames should be available, while a liberal supply of flats and pots and plenty of good soil are essential. The soil should be made up of one-third rotted stable manure, leafmold or other organic matter, one-third good loam and one-third sand. If prepared some months before use so much the better.

Few gardeners possess a greenhouse, but a frame heated with fermenting manure or electricity serves equally well. With a hotbed, various seeds can be started in late February or early March, and when large enough to transplant, the seedlings can be shifted into other flats and later into a coldframe to harden off.

The frames can be utilized for Melons or Cucumbers during the Summer if not required for other purposes.

When starting the seed in flats or in the bed, the soil should be thoroughly screened and firmly pressed down level.

Draw shallow furrows in the soil and after sowing the seeds lightly cover with sand and shade. The soil should be just moist at time of sowing. Keep shaded until small seedlings are noticed coming through the soil; place the flat where it will receive proper light, but avoid sunshine at first.

From the time the seedlings are planted until they come up, daily attention to watering the flat or bed is necessary. The soil should be reasonably moist but not soggy. Watering should take place in the morning.

Plants grown in the greenhouse, hotbed or coldframe need fresh air; therefore, attention to ventilation is absolutely necessary. However, do not give so much ventilation that the beds are cooled down and the growth of the seedlings checked.

The hardy plants such as Cabbage will germinate and grow in a temperature of 50 deg. F. but tender plants, like Tomatoes, Eggplants, Peppers, and Celery, need a higher temperature to start them and more care in watering and ventilation.

As soon as the seedlings have made their first leaves, they should be transplanted into other flats or beds of prepared soil. The seedlings should be set at the same depth they were originally, and 1 in. or 2 in. apart. Shade for a day or two, but afterwards expose to the light and in a few days full sunlight can be given.

Careful watering and ventilation is necessary at the start. Ventilation during the middle of the day is decidedly helpful, and, of course, longer on warm days. If the plants start to dampen off, withhold moisture and sprinkle sand over the surface. Remove all dying seedlings and destroy them.

In some instances a second transplanting is advisable. Some shift into pots in order that they may have the very best plants obtainable. Either clay or paper pots may be used, 3 in. being large enough for Tomatoes, Peppers, etc.

Before the plants go out, it seems best to gradually harden them by exposing the flat or frame to more and more air until they are uncovered day and night. Of course, one must guard against an extremely cold night. Tomatoes will not stand the least frost.

Before transplanting the plants in the garden, the soil must be in good condition. Openings in the ground should be made large enough to hold the plant roots in as near their normal position as possible. In dry weather pour a cupful to a pint of water on the roots; let it soak away before filling in with soil. A potted plant will suffer no check but a plant taken out of a flat will do almost as well as a potted plant, provided the soil has been cut into a cubical block. If the soil is shaken off the roots when transplanted, shade for two or three days, if the weather is bright so that the plant may regain its balance and form root hairs in order to bring in moisture and plant food to maintain it above ground.

When planting or sowing vegetables outdoors, keep to straight

rows as it renders cultivation much easier. For sowing seeds outdoors—and many seeds have to be sown where they are to remain—lay down the line accurately and with a small hoe, draw shallow furrows, the size of the seeds governing the depth. The usual plan is to cover the seeds two or three times their own diameter. It is advisable to sow moderately thick and later thin out; some of the thinnings may be used for filling gaps used by non-germination or insect pests. Peas and Beans are best sown in continuous rows, like Carrots, Parsnips, etc., but Corn is usually planted in hills, that is several seeds at 12 in. or so apart, the weakest plants afterward being pulled out.

Thinning of the seedlings should be done while they are small. Hills of Corn with only four plants, or three of the larger sorts, are better than hills with six to nine plants. Cucumbers and Melons do best if kept two or three to a hill. Beets need from 2 to 3 in. between each plant for best results; Carrots rather less space. Several varieties of Lettuce, for heading purposes, need from 9 to 12 in. while the Iceberg, New York or Wonderful type require 18 to 26 in. each way.



A vegetable garden for supplying a large household

Here, as in the smaller gardens depicted on other pages, cleanliness and careful cultivation are pre-eminent. Observe the handsome pergola around the exterior

CULTIVATION

What is cultivation? It can almost be summarized in the two words, "weed killing." But it also serves to keep the surface of the soil open and thereby conserving moisture. Soil that pans down after a rain, evaporates much more moisture than when the surface is kept loose.

Weeds are best killed when they are small and frequent stirring with a hoe or cultivator effectively checks their growth.

In large gardens, a wheeled machine with hoe or cultivator teeth will be found useful. With these machines it is possible to work so close to the plants that very little, if any, hand weeding is necessary. A large variety of implements can be attached to these machines and the expense is not large. Such tools will last almost a lifetime with care.

Among hand hoes there is the old reliable scuffle or shove hoe, a tool used in commercial gardens among such crops as Lettuce, Spinach, Beets and Carrots. Double edged, it does not work deeply in the soil, but properly handled it can be used close to the plants in the row.

WATERING PLANTS

Plants need an abundance of water as they are largely made up of water, and through their foliage, transpire a tremendous amount. When plants are freshly transplanted, a liberal supply of water is necessary to enable them to catch hold and grow.

During dry seasons, heavy applications that will penetrate several inches is recommended. Surface watering causes the plants to send roots upwards instead of downward.

A garden sprinkler, such as used on a lawn, or a special garden irrigation, is very helpful. If these are started at about four o'clock in the afternoon and run until bedtime, they will do the job thoroughly.

SUMMER FERTILIZING

During the Summer time it may be necessary to add fertilizer to many of the growing plants. Summer fertilizing of Celery is highly beneficial as it is to Spinach, Cabbage and Onions.

Nitrate of soda, or one of the other concentrated fertilizers are generally used. Just sprinkle a little each side of the row of any crop which does not seem to be growing fast enough. Another application two weeks later, may be helpful, particularly on Celery, or a late crop of Spinach.

TRAINING PLANTS

In the garden it is advantageous to train some plants. Beans of the climbing sort generally need a support, either poles, wire netting, or strings. Tomatoes may be supported in a similar way, as well as Cucumbers, Melons, Squash, and Pumpkins, provided the heavier fruits are held up with a net bag. Cucumbers can be grown on a wire screen, thus conserving space. Squash or Pumpkins can be grown over a frame, even up the side of a house.

In many gardens, Tomatoes are grown on stakes, the plants being allowed one main stem and no laterals. By this method, choicer and earlier fruit are obtained. Cucumbers or Melons, if on trellis should have some of the lateral growths cut out, also Squash or Pumpkins. After a limited number of fruits have set, the tops of the vine shoots may be pinched off. Why not have two good melons on a vine instead of six medium to poor ones, or one good Squash instead of a dozen small inferior ones?

When Celery has reached a height of 12 in. or more, it needs blanching. Ordinary building paper on each side of the row to the same height as the plants, is quite commonly used. The paper is held in place by wire staples, these staples inserted about every 2 ft. over the top of the paper and down the sides into the soil. An ordinary roll of smooth roofing or building siding, 3 ft. wide, may be used. Cut same with a saw into three 12 in. widths. Wire may be purchased from any hardware store, No. 14, or slightly larger, being about the right size. Cut the wire into $2\frac{3}{4}$ ft. lengths.

Cauliflowers should have the leaves tied over the top of the head as soon as the curd or white head is noticed. In a week or ten days the head will be ready to cut. It should be pure white. Endive need blanching, both the Batavian Escarolle and the Curled Endive. Tie the outer leaves over the center portion and within a week or ten days the center will have blanched.

PESTS AND DISEASES

The price of civilization is more pests. It is therefore very important that the home gardener learn all he can about the various pests and how and when to fight them. It is not necessary to describe pests in detail here, nor their control—garden pests and diseases have a chapter to themselves.

The principal thing to keep in mind is that clean culture keeps down weeds which often encourage pests and diseases, while prompt application of remedies when the trouble is first apparent usually prevents it becoming serious. Indeed the skilled gardener does not wait for an outbreak, but usually applies a spray or dust to prevent an attack.

As indicated earlier, both sprayers and dusting tools are available and in a small garden, the Feeny duster made like a syringe, and costing about \$1, is as useful as anything. Dusting or spraying is not a pleasant task, but if properly done it gives a feeling of satisfaction. The thing to bear in mind is that sprays or dusts must be applied to all parts of the plants, and particularly under the leaves where pest and diseases most frequently work.

In the case of the Cabbage maggot and certain other pests, the remedy should be applied at a specific date. Near New York, May 1 to 5 is the best date, as it is at this time that the first eggs are hatched.

HARVESTING THE CROPS

If the garden is well planned, harvesting should be continuous after about the first of May, but much depends on the season and facilities. From this time on until frost the garden lover should have an ample supply of all the good things that it is possible to grow. When gathering Tomatoes, pods of Peas, etc., one should be careful not to injure the plant so that it may mature the remainder of its crop.

Some root crops are easily removed from the soil by pulling. Beets can be pulled when they are small and Carrots, if the soil is well prepared, readily lift. Lettuce can be pulled up and the roots cut off, Spinach, Cabbage, etc. also.

Just when to harvest is very important with some crops. For example, Golden Champlain Muskmelons should not be fully ripe before they are taken from the vine. In fact, as soon as they show the least color, remove them, otherwise they are liable to crack open near the stem and will quickly turn soft and mushy. Bender's Surprise, a large late Melon, and many of the other old types, need to be fully ripened on the vine before removing them, otherwise they are very insipid in flavor. When fully colored and ripened they have a delicious sweet quality.

Sweet Corn is best harvested when in the milk stage. If the kernels are of too large size and glazed over, they are generally mealy or hard

and do not have the fine flavor of the milk stage. The milk stage is when the kernels have just filled out. In yellow Corn the kernels should be bright yellow, not dark; in white Corn, a pearly white. If not sure as to color, press a few kernels, and if a milky substance flows freely from them, they are just fit to eat and the ears should be plucked. If a pasty milk is pushed out from the kernel, they are generally too old and less satisfactory.

With Cabbage the heads should be firm, somewhat glazed on top and showing signs of strain. Cabbage, as you know, grows from the inside, the outside only expanding. If the heads remain in the garden too long they will burst open and be of less attractive food value.

Head Lettuce is somewhat similar to Cabbage. When the heads are firm and before a growth (such as seed stalks) starts inside, they should be harvested.

Carrots and Beets of smaller size are much sweeter and of better quality than when they become too old. Beans, when they are small, are much more desirable than when they are large and too full. Green Peas should be plump and not too old. In fact, most of the garden vegetables are much more edible, have a greater amount of flavor or taste when on the young side.

STORING

What can be stored? Almost anything may be stored for a limited period if the gardener will meet the particular requirements of the plant. Carrots, Beets, Cabbage, Squash, Pumpkins, Potatoes and, in a limited way, Celery, Endive and Lettuce are the things most generally stored.

The requirements for Beets, Carrots, Parsnips and other roots are very similar. A low temperature is required, medium moisture and a reasonable amount of ventilation. These can generally be stored in boxes or baskets in the cellar, particularly in a cellar which is not too warm. All of them can be stored in barrels or boxes, starting with a layer of sawdust or sand, then a layer of the vegetables to be stored, then sawdust or sand again and then a layer of the vegetables. This takes up a little more room but does prevent the excessive, quick drying-out of the product.

Such storage would not do for Squash and Pumpkins; they need dryness, not much ventilation and a temperature of 50 to 60 deg. Store them in the attic or in a room in the house, and if you grow Sweet

Potatoes, put them in the same room. The Squash and Pumpkins should not touch each other, because if they do and one decays, others will follow. Neither Squash, Pumpkins or Sweet Potatoes should be handled after being placed in storage, except to be taken to the kitchen to be prepared for cooking.

Cabbage can be stored in the cellar where Potatoes and other roots are stored, either by lifting the entire plant in the field and burying the roots in soil in the cellar, or lifting in the same way and tying a string to the roots and hanging to the floor joist on a nail. It can also be stored by cutting the heads and packing them in boxes or barrels, spreading a newspaper or cloth over the top of the barrel and perhaps an inch or more of sawdust. Cabbage needs a low temperature, only a medium to small amount of ventilation and just a small amount of moisture.

Celery, Endive and Lettuce are very difficult to store over a lengthy period and hardly worth attempting in view of the ready supplies in the shops throughout the Winter.

From the above it will be seen that an ordinary cellar may not be the place to store vegetables, particularly if there is a furnace or heater. If a place can be partitioned off from the balance of the cellar where lower temperatures may be maintained, select, if possible, a corner of the cellar having two windows that can be opened for needed ventilation.

For large storage a special cellar should be built, or a pit could be dug in the garden in which many of the vegetables mentioned could be stored. The main thing is to insulate the structure to prevent entrance of excessive cold. Such buildings or pits must have intakes for entrance of fresh air and vents for outgoing foul air.

RECORDS ARE VALUABLE

Why are records valuable? How do you know what you have done or what the results have been in the garden if you do not keep records? Has the garden been worth while after all? How much have you taken from the garden in products? What has it been worth? What have the seeds cost; what varieties have you used; where have they been planted? These facts are all useful in planning for the next year's crop. However, to the gardener who grows vegetables mainly for his health and pleasure, actual costs are a detail. If he values his time at so much per hour, the returns might not seem profitable, but the advantage of having a constant and fresh supply is not to be computed in dollars and cents.

VARIETIES

Cultural directions follow for the more common sorts of vegetables.

ASPARAGUS

While 50 ft. of row may suffice a small family, a far greater allowance must be made for a large family, especially if canning is undertaken. Asparagus comes into production very early in the Spring. It requires, however, a year or more to become established. Select a reasonably drained portion of the garden in a section which need not be plowed each year with the remainder of the garden. Dig out a trench down to the sub-soil or at least 9 in. deep. If this carries one into the sub-soil, spade out an inch or two more and put in some good composted soil or top soil. The trench should be 9 in. deep. Place therein one-year, well grown Asparagus roots 9 to 10 in. apart from center of plant to center of plant. Cover the plants with from 1 to 1½ in. of top soil. This planting should take place very early in the Spring before the buds on the roots have started. As soon as the soil is placed thereon, a 5-8-7 fertilizer, at the rate of from five to ten pounds on a row 100 ft. long, should be spread along in the furrow. If compost or stable manure is available, an inch of this material should be spread in the furrow. From this planting on leave the crop alone, except to kill the small weeds that grow on the side of the bank; rattle a little of the soil down into the furrow at each hoeing or cultivating until, by the Fall of the year, if the tops are 3 ft. tall or more, the trench should be filled in with good soil. If in the Summer time the plants are not coming on as they should five pounds of nitrate of soda applied in the furrows will help, particularly if the tops of the plants have not developed. If another row is desired, have it 5 ft. away from this first row. With top growth 3 ft. tall the first year, the Asparagus can be cut for three weeks the next Spring. If the growth gets up to 6 or 7 ft. in height, it may often be cut a longer time; say, five weeks. The second year, after cutting, it needs additional fertilizers and clean cultivation, and the tops should grow to a height of 5 to 7½ ft. The Spring of the third year cut the Asparagus until the latter part of June. From then on each year cut it until July 1 to 10. Have all you want, but each year put on new fertilizer.

Should you encounter trouble in your garden, do not fail to consult Chap. XXIX—"Insect Pests," and Chap. XXX—"Diseases of Garden Plants."



Quality Beans are obtained from quality varieties

BEANS

Beans thrive best in a warm, sandy loam. The soil should not be too rich. It is not extra large tops that are wanted but reasonably sized plants and plenty of pods. Do not plant the Beans too closely together. For the Snap type three to four plants per running foot are enough. For late or Lima Bush types one or two plants per running foot of row is enough. In this way, more Beans will be obtained per plant and per row and Mexican Bean beetles will be more easily controlled because the dust or spray can readily reach the foliage. Beans should be planted after danger of frost is over unless the gardener wishes to risk the seed. Succession plantings, three weeks apart, will give a continuous supply of the product. This does not apply to shelled Beans nor Pole Beans. One planting of them is generally sufficient.

BEETS

Beets require a rich soil. They are even benefitted by a little nitrate of soda applied to the soil after the tops have reached a height of 5 or 6 in. Rows can be 1 to 3 ft. apart. Three or four plants per foot

of row are enough. If one cares for Beet greens, plant the seed thickly, and when the tops are of the size desired, thin out allowing the permanent Beets to remain at the distance stated above. Two or three sowings through the year will give a succession of the small delicious Beets, if made about three to four weeks apart.

BRUSSELS SPROUTS

Plants purchased or raised in a specially prepared bed seem to be best. They should be ready to transplant to the field from the middle to the latter part of June. Spacing the plants from 15 to 24 in. apart in the row, and the same distance or more between the rows, is about right. Reasonable fertilization of the garden, as mentioned previously, should be practiced. It is not necessary to break off the leaves to grow the small Sprouts which develop at the base of each leaf. These sprout-forming characteristics are inbred. Otherwise, Brussels Sprouts is handled the same as Cabbage.

CABBAGE

Early Cabbage can be started from purchased plants or can be home raised. Place the plants out in the garden in late March or early



Brussels Sprouts, the choicest quality in the Cabbage family



Choice Cabbage of good quality

April. Heavy fertilization is necessary on an average to rich garden soil. In the middle or latter part of April an application of nitrate of soda would be helpful in pushing the plants to early maturity. Space the Cabbage (preferably Early Copenhagen, sometimes called Golden Acre) 12 to 15 in. apart in the row and from 24 to 28 in. between the rows. For mid-season Cabbage, such as the Flat Dutch group, seed may be started the forepart of April and the plants set out the last of May. Greater spacing between plants is necessary because each plant is larger than the previously mentioned variety. For the late Cabbage, including the Savoy, the seed may be started from the first to the fifteenth of May, the seedlings being transplanted to the garden from the middle to the latter part of June. Not much fertilizer is needed to grow this late crop or the midseason crop, the average fertilization given the garden being sufficient. The late Cabbage is spaced from 18 to 24 in. between plants and 28 to 36 in. between rows.

Chinese Cabbage can be grown in the same way as late Cabbage and at the same time. The Chinese Cabbage is spaced 9 to 12 in. between plants and 18 to 28 in. between rows. These latter types will come on in the cool of the year and much of them can be stored.

CARROTS

The general cultural requirements for Carrots are similar to those suggested for Beets. Carrots do not need the extra application of nitrogen carried in nitrate of soda. Just the ordinary fertilizing as suggested for all the garden vegetables is sufficient. The seeds are small and weak and should not be planted more than $\frac{1}{4}$ in. deep and quite thickly in the furrow. As soon as the seedlings are 1 in. or slightly more in height, thin out so that one Carrot plant is found every 1 to 2 in.



Early Scarlet Horn Carrots

apart. The greater distance will give quicker development and probably better shaped Carrots. The rows can be 12 to 18 in. apart. Several plantings can be made in the year, one very early in the Spring, another the last of May or the forepart of June and in July for the late crop. Don't neglect the late crop of Carrots or Beets. Give them a little fertilizer and keep the weeds under control. The late crops are for storage purposes. For the best flavor and structure of the Carrot the smaller sizes are recommended.

CAULIFLOWER

Cauliflower is handled very much as is Cabbage but it needs almost three times the attention. From the time the seed is planted until the crop is harvested, it should have continuous growth. Any check in this growth means a small or poor head or none at all. Start the seeds a week or ten days later for the early crop than is mentioned for the early crop of Cabbage. Plant the seedlings outside a week or ten days later or, if a very late Spring, even two weeks later than the early Cabbage

crop. For the late and main crop, plant as suggested for late Cabbage. Cauliflower is a very fussy crop. Have plenty of lime in the soil, also an abundance of plant food, both rotted stable manures and good balanced fertilizer such as is used for Potatoes. Be liberal with it. Cultivate very frequently but very shallow. As soon as the curd or curd is noticed, tie or pin the leaves over the head shutting out the sunlight from the head. Before doing this, be sure that the green worms are under control, otherwise spotted heads may result. In warm weather, in less than a week the head will be ready to cut. The cooler the weather, the longer it takes the plant to grow a 6 in. pure white head of Cauliflower. Cut the head before the curd opens or separates.

CELERY

Seed may be started early in the Spring in the greenhouse, hotbed or coldframe, transplanting once or twice and finally being ready when 3 to 5 in. in height for planting in the outside garden. Young Celery is very tender and needs heat for its best development. By young is meant 1 in. or less in height. The seeds are very small and need to be only pressed into the soil. The seeds are slow in germinating and need care and attention during their early growth. Plants should be set in soil which has been liberally supplied with lime, amply supplied with stable manures and plenty of fertilizer. Celery and Asparagus are the two plant-hogs for fertilizer consumption. The plants may be set in rows almost any distance apart, preferably 18 to 24 in. for the early crop, with 5 to 6 in. between plants in the rows. For the late crop, seed is started in late April or the first of May, generally in the open ground or in specially prepared beds. The seedlings are ready to set out in the latter part of June or even through the first part of July. The lime and fertilizer mentioned for the early crop applies for the late crop. In both the early and late crop, as soon as you notice the plants start to grow, use a pint of the 5-8-7 fertilizer along each side of the row of Celery, stretching it out to cover 25 ft. in length of row. Nitrate of soda can be substituted. In three weeks make a second application, and three weeks later a third application. Rake or cultivate this fertilizer into the soil. Sometimes a fourth application may be helpful, particularly on late Celery.

Of course, Celery plants can be purchased from the local florist or from most all vegetable growers. It may be cheaper to purchase one's needs than to raise them. When the Celery has reached 1 ft. in height

blanching can start. In the home garden, paper is undoubtedly the best material to use. Ordinary building paper, 12 in. wide, cut from a roll, the building paper being arranged to stand up on edge on each side of the Celery and held in place with wire staples or pieces of lath or small boards, will soon shut out the light and cause the Celery to blanch or turn yellowish in color. It generally takes three weeks to do this work and sometimes longer. Keep the paper very close to the row of plants to be blanched. There are people who use three or four pages of a magazine and wrap this around each Celery plant, placing an ordinary clip at the bottom and top of the rolled pages. Such blanching material will certainly do the work. It requires a little longer time to put it on and to take it off. Ordinary building paper can be used for several years.

In the Fall of the year, generally late October or early November, Celery plants can be lifted, roots and all, and planted in soil in the basement, or they may be placed in trenches in the garden. Remove all broken, dried or discolored outside leaves. Properly protected from freezing weather and with ample ventilation, Celery can be kept for some time.

CHARD

Chard is really Silver Leaf Beet. The general culture is similar to that mentioned for Beets, except that one plant every 9 to 12 in. is enough. Also the harvesting of the crop is different from Beets. With Chard the outside leaves are removed, the leaf blade being used as a pot herb and the stem or "petiole" of the leaf cooked like Asparagus. One planting is sufficient for the year.

SWEET CORN

As previously mentioned, several plantings of Corn will probably be needed in practically every garden. Corn may be planted in at least two ways: in hills, three to four stalks being permitted to grow per hill, or in rows, each plant being about 9 in. from its neighbor. More than one row of Corn should be planted at a time, three or four rows or more being the best practice, as the pollen from one row may not fertilize all of the silk and therefore the kernels, whereas it is more liable to perform this function where three or more rows are planted. Corn develops quicker if given ample room. For the early, shorter types of Corn, hills 2 ft. apart and rows 3 ft. apart, four plants per hill,

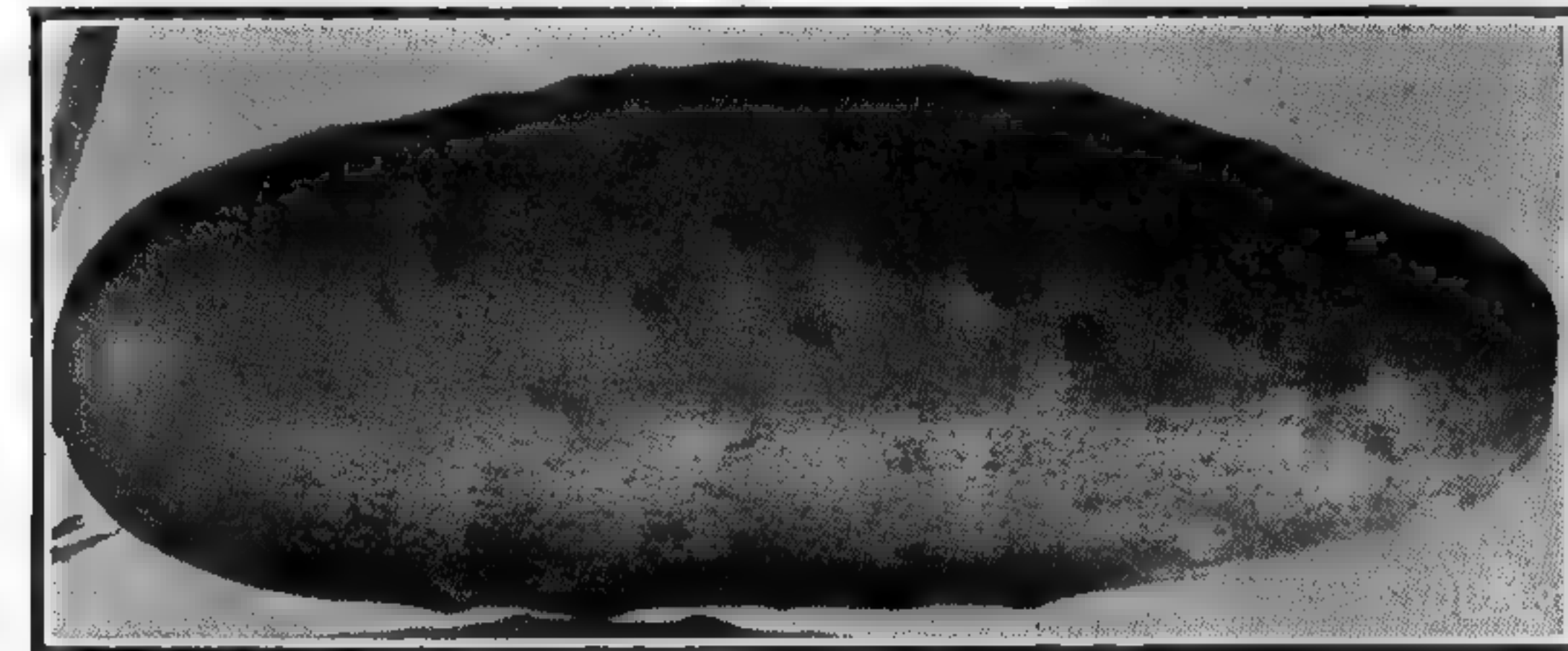
are suggested. For the later, larger growing varieties 3 by 3 ft. between hills and rows with three stalks per hill will give plenty of Corn per hill. To obtain three or four plants per hill necessitates the planting of double the amount of seed and later thinning out. It is not necessary to sucker Corn. Any planting of Sweet Corn is only edible about a week or ten days. There are a few varieties like Whipple's Yellow that are edible over a longer period. By edible, I mean very desirable.



Delicious Sweet Corn, a favorite in most families

CUCUMBERS

A good garden soil with plenty of rotted manure therein is really needed for the best Cucumber development. Celery and Cucumbers are the two crops which really need rotted stable manures for their best development. They also need plenty of fertilizer, Cucumbers being particularly influenced by nitrogen or nitrate of soda. Cucumbers also need lime. Plant a few seeds in a hill under a hot cap before the latter part of April. Hot caps are paper covers sold by seedsmen. By their use quicker germination and growth is secured. The hills should be 4 to 6 ft. apart each way. Ventilate the hot caps in good weather, and when the plants are well started, remove the covering



White Spine Type Cucumber

entirely. Allow 5 to 6 ft. between rows; one plant every 10 to 12 in. in the row is enough. At first the vine starts to grow upright. Before it falls down, spread a second application of fertilizer or nitrate of soda around the hill or on each side of the row. Close attention to pests, particularly the striped Cucumber beetle, is absolutely essential.

DANDELIONS

A short row or part of a long row planted to Dandelions in the perennial garden gives spice and vigor to the diet. The plants come on early in the Spring. The cultivated types are much superior to the wild ones; they are less bitter, contain less weeds and are more easily handled. Sow a few of the small seeds in a row in Spring. Give careful attention to them as they come above ground. Keep them free of weeds during the growing season. The next Spring fine Dandelion plants will be ready to eat as a start off with Asparagus from the garden. The row will last for three or four years. The first year a single

Should you encounter trouble in your garden, do not fail to consult Chap. XXIX—"Insect Pests," and Chap. XXX—"Diseases of Garden Plants."

plant is produced on the root; the next year two or three plants. In later years two or more plants are produced and as they become smaller, plant a fresh row.



Eggplant

EGGPLANTS

The Eggplant is a warm weather crop. The plants should be started under cover, as described for Tomatoes or Peppers.

A limited number of Eggplants, say six to a dozen, in a garden is all that is needed. They require about the same space as Peppers and about the same fertilizing as Peppers and Tomatoes.

Black Beauty and New York Improved are the two outstanding varieties, although many home gardeners prefer the novelties, such as Ivory or Long Purple.

The diseases and pests on these crops are similar to those described under Tomatoes.

ENDIVE

Endive is a Fall crop for use in salads or as a cooked pot herb. Sowing the seed in late May or through June is about right. The seed is small and rather weak and does not need to be planted deeply. The rows can be as close as 12 in. After the seedlings come above ground and are 2 or 3 in. in size, thin out so they stand 10 to 12 in. apart. Keep them weed free, and in late August and through September a delicious salad vegetable will be available. There are people who like the broadleaf Batavian Endive, most generally called Escarole, unblanched. Where it is required to blanch it, bring the leaves up from the center of the plant and tie with a piece of string or raffia or place an elastic band around. This should be done in the afternoon when the plants are less brittle. In about ten days the center will have lost its green color and very tender blanched leaves will be available. The curled Endive is handled in the same way. It should be remembered that blanching is the first step in decay, and if allowed to be carried too far, soft rots will set in. Eat the delicious blanched Endive before soft rots set in.

HORSERADISH

A piece of Horseradish root, 4 to 6 in. long, the size of a pencil, can be placed almost straight down in the soil with the top of the root about 1 in. from the surface of the soil. After a bit the leaves will develop and the plant will cover the ground if the soil is reasonably supplied with plant foods and carefully prepared. Sometimes the crop is planted between or in where Radish or Lettuce has been growing as an earlier crop. Where several rows are to be planted, 18 in. or more between rows should answer, and from 6 to 12 in. between plants in the row. The crop can be harvested in the Fall or it can be allowed to remain until Spring. In fact, in the Spring part of the row can be allowed to develop small leaves, these making an excellent green or pot herb. Frost or freezing does not injure Horseradish; that part of the crop remaining over Winter is ready to dig in the Spring, and when grated supplies a good strong Horseradish for the table. A few plants should be in every garden.

KALE

Kale or Borecole is a member of the Cabbage family. It is largely planted as a late crop and is generally cooked as a pot herb or as greens. Plant in a row and thin out so there is a plant every 6 to 15 in., with the rows spaced at least 2 ft. apart. In the Fall of the year, under ordinary garden care, a large collection of leaves will be available for food. Kale is perfectly hardy and will live through the Winter, even being picked in January and February on warm days. For Fall and early Winter use the Scotch Curly Kales are recommended, and for Wintering over the Siberian or flat-leaved type is suggested. When carried over Winter, Kale comes on very early in the Spring, particularly if a little nitrate of soda is spread on the soil near the plants. This makes another green available for early Spring consumption.

KOHLRABI

Kohlrabi, both the green and purple, has largely taken the place of the early Turnip in many homes. It may be handled similar to early, midseason and late Cabbage, except that the plants are spaced closer together in the rows and between the rows. Six inches between plants in the row and 12 to 14 in. between rows is enough. The small

Kohlrabis are more tender and therefore more edible. The late planting, if not too large, can be stored by cutting off the woody stem and the leaves and placing in barrels or boxes in saw dust.

LETTUCE

Commercial growers have almost forced everybody to eat the so-called Iceberg Lettuce, that being the common name of the variety shipped from the West and Southwest to almost every market in the United States. This Lettuce does not need heavy fertilizing. In fact, it will not give good results if too much stable manure or too much nitrogenous fertilizer is supplied. It must grow slowly for best development. Just as good heads are raised in the East or in other unadvertised sections of the country as are sent out from California, Arizona, Colorado, or any other Western section. Plants can be purchased in the Spring or seedlings may be raised. For the early crop, place the seedlings outside about the middle to the latter part of April. Keep the weeds down when the plants are small; in other words, give it frequent cultivation. Don't apply nitrate of soda to the soil. Space the plants at least 18 in. apart each way; even 22 to 26 in. is none too far apart. The heads will come along in good shape, other things being equal.

Not everybody likes this coarse Lettuce which does not have a tasty flavor. There are still people who want Mignonette, the highly flavored, aromatic type, or even May King, Big Boston, Salamander, or the others of our so-called native types. All of these require less space, 12x12 in. being enough for each plant, and they need much more fertilizer and manure than mentioned for the Iceberg type of Lettuce. Sometimes a gardener only cares for the tender leaves of small Lettuce. Several plantings can be made in a year if this is the only product desired. Where one wishes Lettuce of a heading type throughout the year, the following program is suggested: Transplant May King to the garden in early April. The middle or latter part of April



Tender Head Lettuce



Orange- or pink-fleshed Melons are considered of the best quality

transplant Iceberg type or Big Boston. The middle or last of May sow Salamander. Sow some more Salamander on the 1st to the 10th of June. In July sow seed of May King, Iceberg, and Big Boston and thin out or cut as you wish.

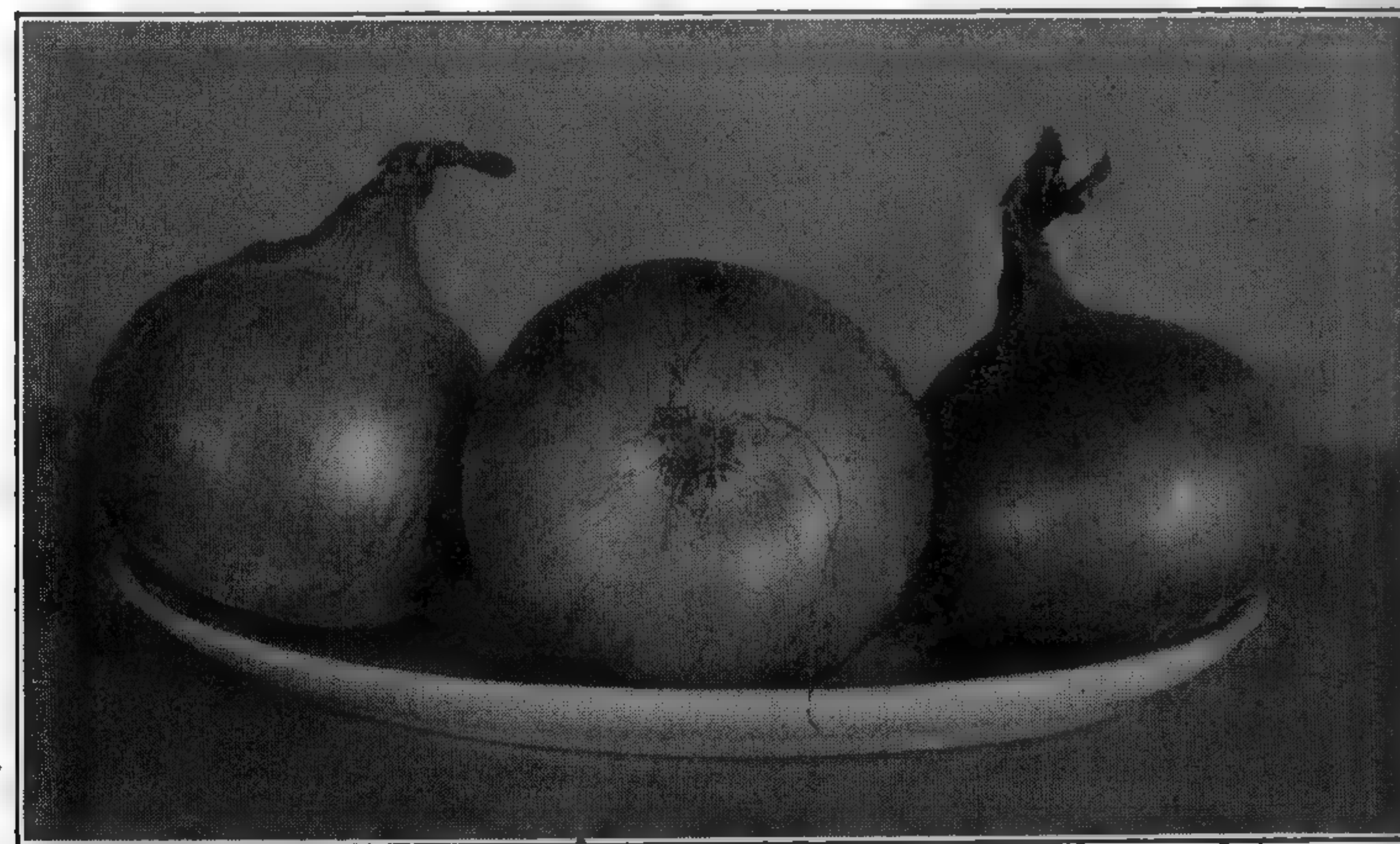
MUSKMELONS

Try a few Muskmelons in pots in the greenhouse, hotbed or cold-frame. Seven to eight seeds planted in a 3 or 4 in. pot should make enough seedlings for transplanting outside when weather conditions have become fully settled. Therefore, the seed should be planted in this receptacle 25 to 28 days before the plants are to be placed in the outside soil. Choose good orange or pink meated varieties. A few grown under hot caps, as mentioned for Cucumbers, offer advantages. Melons also can be planted in the garden in hills or rows, as mentioned for Cucumbers, with the same spacing. The striped Cucumber beetle is the worst pest. Keep Melons growing as mentioned for Cucumbers. Many people believe that Melons planted near Cucumbers or Squash cross-pollinate. This is pure bunk. Scientists, with all the para-

phernalia they have at hand, find great difficulty in making a cross of these plants under the most ideal conditions. A young unripe Melon tastes like a Cucumber. In middle life it probably tastes more like a Pumpkin. When ripe it has its own delicious taste if it is the kind that should have that flavor.

ONIONS

For the average home gardener the growing of Onions from seed has almost stopped. It should. So many problems confront the gardener who raises Onions from seed that it is not a profitable venture. Not many gardeners would be able to control even one pest, the Onion maggot. Instead of seed, the Ebenezer Onion sets can be used, which will eliminate the maggot to a very great degree, and in this way fine Onions are obtainable for rare-ripes or for storage. This Onion will keep throughout the Winter as well as any Onion ever produced. Somebody nicknamed the old Ebenezer Onions "Japanese." Their real name is Ebenezer. They are very similar to the old-fashioned Flat Danvers, but have a heavier skin, similar to the Australian Brown. They are of mild flavor. Plant the sets in the early Spring, just as soon as any other plant or seed is placed in the ground. Twelve sets per foot is enough. They should not be placed too deeply, the top of the set being at the surface of the ground. Twelve inches between rows



Ebenezer Onions are of mild flavor and good keepers

is about right although more space can be given if desired. During the early Spring, if young Onions are desired, pull out every other plant if at all developed. Those left should produce large bulbs, ready to store in the middle or late August. They can, of course, be used long before this. Onions need ordinary good garden soil, and when the tops are 6 to 7 in. tall, sprinkle nitrate of soda over the ground at the rate of 4 oz. per 25 ft. row. Poultry manure may be substituted for nitrate of soda.

There are people who like Scallions. The proper name for these is Egyptian Tree Onion. Plant the sets in late August or early September, just as thickly as they can be placed in the rows, with the rows 12 in. apart. Have each set stand perfectly upright and then a straight-stemmed Onion will result. During the Winter a slight covering of hay or straw may be given. The sets grow somewhat through the early Winter but make faster growth early in the Spring; therefore, in late March put on a small amount of nitrate of soda to help in this growth. As soon as the plants are 7 to 9 in. tall, the Onions are ready for consumption as rare-ripes.

PARSLEY

Used as flavoring in soup or salad or for a garnish on meat or fish a few plants of Parsley are desirable. A short row, 5 ft. long or slightly less, is all that is necessary. The crop is handled similar to Carrots, except that more space between plants gives better plant growth and better leaves. Six inches between plants is about right.

PARSNIPS

In general the seeds of Parsnips have weak qualities of germination and there is a weak early growth. After that the plants are tough and will stand a lot of abuse. This does not mean that one should abuse them. The rows should be from 15 to 28 in. apart, seeds thick in the row but not very deep. Thin the seedlings when they are about 3 in. tall so that there is a plant every 5 to 6 in. For large Parsnips, space 9 to 10 in. The seed, of course, is sown in the Spring and the crop remains in the ground throughout the growing season. In the Fall the plants may be lifted, using a spade or some other instrument so the long root is taken out without injury, and the Parsnips may be stored in barrels or boxes in sand or sawdust, or in pits. They are not harmed



Hollow Crown Parsnips

much by remaining in the ground over Winter. A few may die but the bulk will live over and fine Parsnips will be available in March or April if Jack Frost has released the soil so one can dig in it. Generally, fertilizer as recommended for a good garden is all that is necessary for this crop. It is generally believed that a bit of frost increases the sugar content.

PEAS

If the gardener is a lover of delicious green Peas, a number of plantings are necessary to fulfill the needs. It is possible to have green Peas to eat for almost two months, beginning in the middle or latter part of June and ending about the middle of August. The wrinkled Peas, such as Laxtonian, Laxton's Progress, Thomas Laxton, Gradus and the tall Telephone types with the many improvements, particularly Alderman, possess the best quality. Start planting some of the lower growing sorts, such as Laxtonian or Thomas Laxton, early in April. In ten days to two weeks plant some more, including a few Alderman. In another ten days to two weeks plant some more, and one or two plantings after this date at intervals of a week to ten days. Peas are great lovers of lime. After the garden line has been stretched across, why not cover the ground with lime, working it in with a hoe or cultivator? Then immediately under the line, open the furrow and plant the Peas. Wait until the plants have come above ground and are 2 in. tall before applying fertilizer. Then use the type suggested for general garden work, applying the fertilizer each side of the row. Small Pea plants are very tender. Cut worms like them very much. If a plant is eaten, better apply poison bran mash for two or three nights and get all of the cut worms. The early varieties of Peas do not need to be brushed or supported. The Laxtonian only grows from 9 to 12 in. tall. Thomas Laxton and Gradus grow from 30 to 40 in. tall. If supported



Taste or flavor in Peas is obtained by planting good varieties as mentioned in text

on brush or wire netting, it is much easier to pick them. All of the Telephone types growing from 5 to 8 ft. or more need brush or wire. Birch bush is preferred. Cut the brush in the early Spring before the buds have opened. Plant lice or aphids are likely to attack Peas in the forepart of July, or in dry, hot weather. This pest can be controlled by using nicotine dust or nicotine spray.

PEPPERS

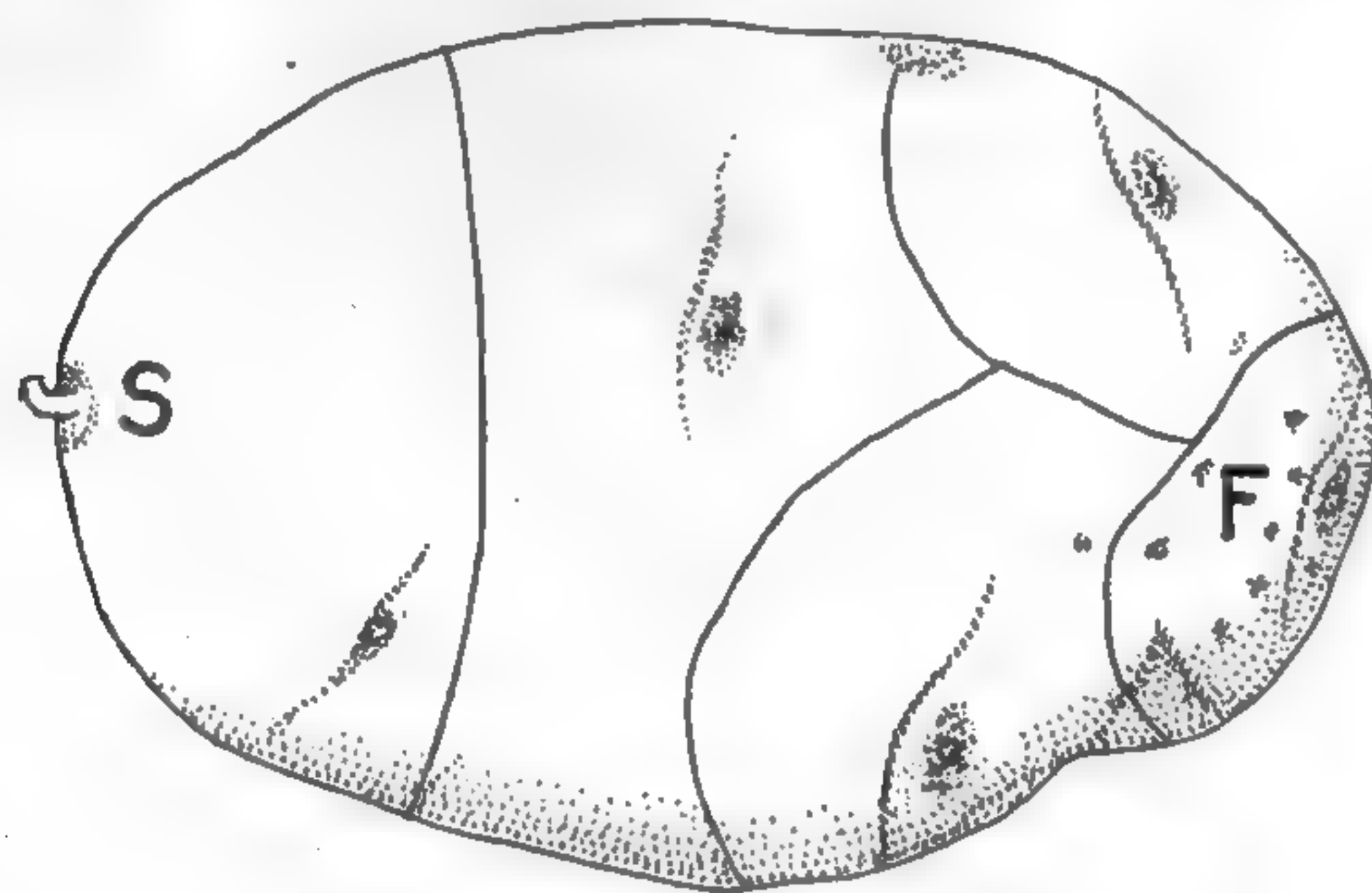
A few Pepper plants in a garden will be very helpful, particularly as Americans discover how to prepare them, either cooked or in salads. Peppers can be started in the forcing structures or plants can be purchased. Only a few are generally needed, from six to a dozen. The larger, heavier fleshed types are preferred. They are generally grown

Should you encounter trouble in your garden, do not fail to consult Chap. XXIX—"Insect Pests," and Chap. XXX—"Diseases of Garden Plants."

in rows, the rows being 18 in. or more apart and the plants 12 to 15 in. apart in the rows. They do not need heavy fertilizing.

POTATOES

In the small home garden there seems to be little or no place for Potato raising. In the average year it is cheaper to buy Potatoes than to grow them. In the larger garden it pays to grow Potatoes. A few Irish Cobbler planted very early, say the forepart of April, in drills 28 to 32 in. between rows, and 9 in. between pieces of Potatoes should give large yields. Fertilizer at the rate of 15 to 25 pounds for a 100 ft. row, should be worked into the soil in the drill before the Potato



Potato tuber, considerably reduced

S, stem end, or end to which it was attached to the parent plant the previous season. F, the so-called flowering or growing end; here there are usually too many buds or eyes—several of these had better be scooped out before planting. The lines show how this particular tube may be cut up for planting, but the eyes vary in each and every tuber

sets or divisions are planted. The Cobblers only need attention to control Potato bugs and occasional flea beetles. For Potato bugs dust or spray with a poison, and Bordeaux mixture should drive the beetles away if the foliage is kept covered. About the middle of May a larger planting of Potatoes of the variety Green Mountain can be made. Rows 3 ft. apart and 12 in. between pieces of Potato in the rows are about right. The fertilizer needs are similar to those mentioned for Irish Cobbler. Green Mountain variety needs to be sprayed frequently with Bordeaux mixture from the 1st of July until the middle or latter part of September in order to check blight and to help drive away flea

beetles and leaf hoppers. Poison should be used to control the Colorado Potato beetle. Hill the crop just as the weeds appear and kill the weeds between the row. Raking down the rows or hoeing them down a little later will have a tendency to keep the ground level. Two such hillings should handle the weed proposition, although in some soils three are necessary. In planting Potatoes use certified seed. Cut the tuber into rather large size pieces on which there are at least two strong eyes.

PUMPKINS

A few hills of Pumpkins in the garden will delight the children in the Fall of the year and also serves to supply the needed material for delicious Pumpkin pies. Years ago Pumpkins were planted in Corn or in Pole Beans. They can be planted the same way today, although a piece of soil at the edge of the garden, allowing the Pumpkins to grow out in the grass or in the other material at the border, will give more room. The small pie Pumpkin is the one preferred. The general culture is the same as recommended for Winter Squash.

RADISHES

One of the first vegetables to be planted in the Spring is the Radish, and it is very hardy. A few short rows can be planted, in five days another planting, and in five to eight days another, and so on throughout the season. After the second or third planting, if red Radish is not desired the White Icicle can be planted. If the plants are thinned to stand 1½ to 2 in. apart, the Radish will develop quicker and therefore be ready to eat much sooner. Radishes are sometimes planted in among Cucumbers and Melons and seem to aid in keeping some insects from these crops. Radishes are also planted between other crops, as the time required for their growth is very short and they are out of the way before the main crop needs the space. Radishes are largely nitrogen and therefore the soil should be amply supplied with fertilizer and perhaps one additional application of nitrate of soda. The Radish has one serious pest—the maggot—similar to the one attacking Onions and Cabbage. This maggot appears about the first of May, and if one or two applications of four per cent calomel dust are made about May 1st to 5th, and at least two applications for all other Radishes just as soon as they break through the ground until the latter part of July, the crop will probably be free from maggots.

RHUBARB

Have a few plants of Rhubarb in the garden. Sometimes one plant is all that is necessary. Rhubarb pies, Rhubarb sauce and Rhubarb preserves will thus be assured. Rhubarb is a gross feeder. Rotted stable manures and commercial fertilizers are welcomed by this plant. Large leaves and large stalks result. Plant the variety that has very red or pinkish stalks. Allow 3 to 5 ft. between plants. After pulling the leaves and stalks apply fertilizer, or if stable manure is used, put the stable manure on early in the Spring. Pulling generally stops about the first of July. From then on the plant must store up food for next year's crop.

SALSIFY

Salsify, sometimes called Vegetable Oyster, is a root crop grown similar to Parsnips, although spacing between the plants in the row may be less, say 4 to 6 in. This crop needs a very loose, exceedingly well prepared soil. If there are many stones in the soil, or the soil is hard, the roots become forked and less desirable. Salsify requires the entire season for growth and culture should be the same as mentioned for Parsnips. It can be stored in the same way that Parsnips are stored.

SPINACH

Spinach has become such a valuable crop for its many vitamins and iron content that more and more gardeners are making succession plantings throughout the Spring and also in the Fall. It can be planted very early in the Spring and every ten days thereafter until the 15th of September. A row or part of a row may be sufficient for a small family or one or two plantings may be all that is desired. The smooth-leaved sorts like Viroflay are planted first. This is followed by the Long Standing Savoy, a crinkle leaf type. Later in the Fall a Yellow Resistance Savoy can be planted. Spinach is a quick maturing plant and can be planted near other slower maturing plants or where either Squash, Melons, Tomatoes or Cucumbers are to be planted later. Applications of nitrate of soda are essential, in addition to the regular fertilizer applied to the garden, once when the first few leaves are forming and again in ten days. Apply the nitrate when the foliage of the plant is dry or during a rain. The plant needs ample lime in the soil. In fact, it is one of the heaviest lime requirers.

The plant known as New Zealand Spinach is grown as a Summer Spinach. This is not a true Spinach. It is, however, quite well thought

of by many home gardeners. The plant is bush-like or sprawling. The seeds are extremely large and hard and slow germinating, but after the plant once starts to grow, it will cover much ground. The rows should be at least 3 ft. apart and the plants should be from 9 to 15 in. apart. The tips of the branches with four or five leaves are the parts cut off and consumed. The more cuttings made, the more branches and tips will result. Ordinary garden fertilizing is sufficient. This is a tender plant and should not be planted until danger of frost is over. It is also easily killed in the Fall. Many people like this Spinach canned as it retains its shape.

SQUASH

Most people prefer the so-called Summer Crookneck, some even now taking the Straightneck as the best type under this selection. In the South the Scallop or Patty-pan types are desired. Both are bush types. They can be started in the hotbed, greenhouse or even in the coldframe during the middle or latter part of April and transplanted to the garden in the middle of May. Early Squash is thus produced. Rotted manure in the hill and application of fertilizer are helpful in pushing the crop forward. The plants are attacked by the striped Cucumber beetle and the remedy suggested for this pest is frequent dusting with lead arsenate. From then on they are of easy culture, except that the weeds have to be kept down. Squash needs a space of 3 to 4 ft. on each side. The late Squash needs more room, from 8 to 10 ft. between hills or rows generally being required. Those in the Hubbard group, either the green or blue Hubbard, are most commonly grown. They have the same pests and troubles as



Crookneck Squash

the early Squash, and in addition are troubled by the Squash borer and the Squash bug. The Squash bug can be trapped under a board placed on the ground near the hill. In the cool of the night the Squash bugs like to crawl underneath a covering such as a board or shingle, and in the early morning it is a simple matter to take up the boards and catch the pests underneath. In handling the Squash borer there are methods of spraying, but the most common practice is to cover the vine of the Squash with soil at the point where it branches out—say, a few handfuls at the base of a leaf every 2 ft. along the stem. Roots will be thrown out, and these new roots will maintain the plant, even if there are a few borers in the stem near the main root. Squashes, as well as Pumpkins Cucumbers and Melons, may be trained up over a fence, on a wire or wooden trellis, and in this way serve as attractive vines. Any fruits forming on the vines must be held up by a netting bag or with string, as the plant is not strong enough to hold the fruit upright.

SWEET POTATOES

It is probably best to buy Sweet Potato plants. A few can be obtained in most any section from nearby nurserymen or seed houses. A sandy loam is preferred. Fertilizer as mentioned for Irish Potatoes is needed. The slips or plants are handled in about the way one handles Peppers and about the same distance apart. Keep the vine from setting roots. The Sweet Potato is tender and should not be planted until danger from freezing or frosts has passed. A few plants in the garden may give all the supplies needed.

TOMATOES

Tomatoes are one of the most common garden vegetables and one of the most satisfactory to grow. Be sure that high quality varieties, such as Bonny Best and Stone, particularly the Greater Baltimore strain, are chosen. Tomato plants can be grown on stakes when pruned, and having one stem (that is, with all laterals removed), spacing 12 to 15 in. between plants in the row and 3 to 4 ft. between rows. They may be grown at will on the ground, with 3½ and 4 ft. between plants. They can be grown against a house or building on strings or stakes, or they can be grown on wire such as poultry wire. Seeds should be sown early in the Spring, say in early March, and



High quality Tomatoes are firm fleshed, tender, and fine in texture

perhaps more seed the first of May for the late and main crop. They should be handled in the greenhouse or coldframe in a careful manner with all the requirements for their best growth. The potted varieties give the best results. Tomatoes are tender and should not be planted outside until after possibility of frost injury is past. They do not need extra fertilizing, that mentioned for the garden being sufficient. The early set plants need to be protected from cut worms by using poison bran mash. Potato bugs and flea beetles are sometimes common. Apply the remedy as suggested under Potatoes. Fungous diseases, such as leaf spot and potato blight, can be controlled by spraying the plants with Bordeaux before the disease has started and during the time when spores are spreading, generally after the first of July. For preserving, the novelty Tomatoes, such as the pear, plum, cherry, strawberry and peach are quite useful, each growing to resemble the crop named. These same sorts are very delicious sliced or as a salad.

TURNIPS

The Early Flat Turnip and the Egg type seem to be preferred by most of our gardeners. In fact, the Flat Turnip has been largely

replaced by Kohlrabi, and it is only in the Fall of the year that the White Egg and the Yellow Globe are desired, and then only for a short period. They are very easy of culture. The seeds are strong germinators and the plants grow quickly. The rows should be from 18 to 24 in. or more apart and the plants approximately 6 in. apart in the row. Eat the crop when it is of small size as when it becomes older it has a tendency to become woody and less desirable. The crop can be planted in early Spring or in late May or in the middle of



Early Flat Turnips

July. Most of the gardeners prefer Rutabagas of the Winter or storage type. These are best planted about the middle of June or slightly later. The seed can be planted in rows 18 in. or more apart with plants thinned to stand from 7 to 9 in. apart in the row. They are ready to harvest beginning the latter part of September, and all should be removed from the ground before heavy freezing sets in. The ordinary fertilizing mentioned for a good garden is all that is needed.

WATERMELONS

These require practically the same treatment as Muskmelons, but in the North a warm, sandy soil is desirable. The plants, being rampant growers, require rather more room than Muskmelons. Coles Early is one of the most reliable sorts for northern gardens; the fruits do not exceed 12 in. in length, but its early character insures a crop, if the plants are given an early start and the season is warm.

*For a complete work on the subject of this
chapter we recommend*

PRACTICAL VEGETABLE CULTURE, by ALBERT E. WILKINSON.

Secure this book where you bought your Garden Guide.

Chapter XX

HERBS

By ALFRED CARL HOTTES

Culture—Winter Protection—Herbs from Seed—List of Herbs

FROM time immemorial herbs have been used for medicinal and flavoring purposes, some being grown for their seed, some for foliage, others for flowers and roots. It is always a genuine pleasure to be able to supply your own wants, pure and unadulterated. The varieties listed herewith, the uses of which are fully explained, will enable a selection to be made of the most desirable kinds essential for home use.

CULTURE

The culture of herbs requires no particular skill; they all like a fairly rich soil, and may be grown from seeds or purchased as plants or dormant roots. A bed 20 by 4 ft. should accommodate all the species required for the average household, but more room may be given, if desired, and beds 3 by 2 ft. devoted to each separate kind.

The annual varieties should be grown by themselves. The perennial varieties should be planted in permanent beds, as they come up each year after being cut down in the Fall.

All herbs grown for their foliage should be cut when the growth is mature, or when the flowers show, tied in small bundles, and hung in a dry place. When thoroughly dry, they can be put in paper bags and hung in the attic until required for use. Those grown for seed should be allowed to blossom and produce seed which, when ripe, should be carefully gathered and dried before storing away. Those whose roots are to be used, should be dug in the Fall and thoroughly washed and dried.

Each variety should be carefully labeled to aid identification.

WINTER PROTECTION

Herbs require some protection during Northern Winters and should be covered with straw, leaves, or manure. The perennial varieties are to be cut down within a few inches of the ground, except Lavender, Rosemary, Thyme, Sage and Wormwood. These should

be left about six inches above ground. Lavender and Rosemary being shrubs, require particular protection, until the wood becomes hard, say until their second or third year.

HERBS FROM SEED

All the appended list are easily raised from seed, except Tarragon, which does not seed and consequently roots must be planted. Sow your seed in a small prepared bed, then plant the seedlings into permanent quarters as they become large enough to handle. If planted on a dull day and watered, success will be assured, or the seed may be sown where it is to remain, and generously thinned out to allow room for development.

LIST OF HERBS

(A indicates Annuals. P indicates Perennials)

- ANGELICA (*Angelica archangelica*). A. Leaves and stalks are sometimes eaten raw, or boiled with meat and fish. The seeds are used for flavoring wines and cakes.
- ANISE (*Pimpinella anisum*). A. For garnishing and flavoring; also in making cordials.
- BALM (*Melissa officinalis*). A. For making Balm tea for fevers, also Balm wine.
- BASIL, SWEET (*Ocimum minimum*). A. Largely employed by French cooks for flavoring purposes.
- BONESET (*Eupatorium perfoliatum*). P. Popular remedy for fever and ague.
- BURNET (*Sanguisorba canadensis*). P. Leaves used in salads and soups.
- CAMOMILE (*Matricaria chamomilla*). P. Used as a blood medicine.
- CARAWAY (*Carum carvi*). A. Grown for its seeds, which are used for bread, pastry and flavoring.
- CATNIP (*Nepeta cataria*). P. For medicinal purposes. Much relished by cats, who will roll in it with great delight.
- CHIVES (*Allium schoenoprasum*). A. Used for flavoring sausages and salads.
- CORIANDER (*Coriandrum sativum*). A. Seed used for flavoring.
- DILL (*Anethum graveolens*). A. Seeds with aromatic odor and hot pungent taste. Used for flavoring vinegar when making dill pickles.
- FENNEL (*Foeniculum officinale*). P. Seeds aromatic for flavoring. Boiled leaves are used in sauces.
- FEVERFEW (*Chrysanthemum parthenium*). A. Used medicinally; a good blood tonic.
- HOREHOUND (*Marrubium vulgare*). P. Leaves used as remedy for colds, for dyspepsia, and in expelling worms.
- HYSSOP (*Hyssopus officinalis*). P. Leaves and young shoots used as a pot herb; leafy tops and flower spikes used for medicinal purposes.
- LAVENDER (*Lavandula vera*). P. Leaves and flowers emit a delightful perfume; much used in the wardrobe to give the linen a delicate perfume.
- MARJORAM, SWEET (*Origanum majorana*). P. A tonic and stomachic.
- MARJORAM, POT (*Origanum onites*). One of the most useful of all the herbs, the leaves being employed as greens and also dried for flavoring.
- MINT, SPEAR (*Mentha viridis*). P. Used for flavoring.
- MINT, PEPPER (*Mentha piperita*). P. Good for stomach and intestinal troubles; also used as a stimulant.
- MUSTARD, WHITE (*Brassica alba*). A. Young seedlings used as a salad.
- PARSLEY (*Petroselinum hortense*). A. Flavoring and decorations for salads, and fancy garnishing.

- PENNYROYAL (*Mentha pulegium*). A. Used medicinally as a stimulant and carminative. Good for keeping mosquitoes away.
- POT-MARIGOLD (*Calendula officinalis*). A. Medicinal and flavoring.
- ROSEMARY (*Rosemarinus officinalis*). P. Leaves make Rosemary tea for relieving headache.
- SAGE (*Salvia officinalis*). P. Leaves used for seasoning meats and poultry; also used as a tonic.
- SAVORY, SUMMER (*Satureia hortensis*). A. Leaves and flowers used for flavoring.
- TANSY (*Tanacetum vulgare*). P. Used in bitters, and as a remedy against worms.
- TARRAGON (*Artemisia dracunculus*). P. Leaves impart a delicious flavor to salads, soups, pickles, etc.
- THYME (*Thymus vulgaris*). P. Grown in every garden for seasoning.
- VALERIAN (*Valeriana officinalis*). A. Leaves very efficacious in the cure of wounds. Heal-all is an old name for it.
- WORMWOOD (*Artemisia vulgaris*). P. Used medicinally as a bitters.



Sweet Marjoram is one of the herbs which is always included in the herb garden because of its fragrant leaves



Chapter XXI

FRUIT FOR THE SMALL GARDEN

By A. J. LOVELESS

Depths for Planting—Apples—Apricots—Blackberries—Cherries—Currants—Dewberries—Gooseberries—Grapes—Loganberries—Peaches—Pears—Plums—Quinces—Raspberries—Strawberries—Cordon and Espalier Training Systems—
Ideal Fruit Garden

SPREAD the truth far and wide, the country over, by every means available. Sufficient emphasis can never be laid on the health-giving advantages to be derived from the free use of fresh fruit. It is beneficial to the adult, but doubly so for the children. It is an insurance against disease. Nothing will assist the processes of nature in such a rational and effective way as the habitual use of fruit. "An Apple a day keeps the doctor away," is an old saying but, nevertheless, a most true one, as many have proved to their own satisfaction, and when one can practice the habit from one's own garden the pleasure is more than doubled.

Fruit gathered fresh from the plants is quite a different article to that which has been picked and packed, traveled and finally exposed to the dust and atmosphere of a public market or store. Then, too, another phase of the satisfaction of growing fruit for your own use and to give to your friends is in the pleasure derived from watching its development from the bursting buds on through the period of flowering to the ripe, luscious, perfect fruit.

It is surprising how much more fruit can be eaten in the garden "out of hand," than when served in the home, and this without the slightest injurious effects. It is the unripe and stale fruit which should be avoided; if you care for your fruit garden it will reward you with fresh, ripe fruit in abundance.

In considering a collection of fruit trees for a suburban garden, particular attention will be given those varieties which produce a maximum amount of fruit in a minimum of space and which are designed to supply the family with fruit for the table and culinary purposes the greater part of the year. Available space must, of course,

be considered in planting a fruit garden, and location must determine to a large degree the manner of planting and arrangement of the different fruits so as to allow each kind the greatest amount of light and air possible. Apples and Pears, Peaches, Plums and Cherries, therefore, should be planted to avoid casting too great a shade on the smaller fruits such as Strawberries and Currants. Raspberries, Blackberries and Grapes should be confined to trellises and not allowed to extend beyond certain limits, but to accomplish this, regular attention to pruning and thinning is absolutely necessary. A small fruit garden judiciously planned and planted will be a source of pleasure and profit, and well repay all the attention that can be bestowed upon it.

DEPTHS FOR PLANTING

A good rule to follow in planting a fruit tree is to set it deep enough so that it will stand up firmly without artificial support. In sandy soil deeper planting may safely be practiced, while on heavy or wet soils shallow planting is recommended. As a general rule 6 in. is quite deep enough for all small fruits, and 8 in. for Apple, Pear, Plum, Peach and Cherry trees.

Dwarf trees can safely be planted to the depth they have been previously grown in the nursery, but not deep enough to afford any possibility of the scion or graft taking root in the soil, otherwise your dwarf tree will cease to be such, as the rooting scion will cause a very strong growth. Undue vigor in fruit trees should be checked by root pruning.

Having chosen a location, proceed at once thoroughly to cultivate the ground, using a subsoil plough, or digging as deeply as possible; then cover the whole with a liberal dressing of well rotted farmyard manure, and a liberal sprinkling of bonemeal, and dig over again. In this plant your fruit trees. Should your soil be a rich loam it will be well adapted for the small fruits as well as Cherries and Apples, but heavy or clayey soils will produce fine Pears, while sandy soil will grow luscious Peaches. A careful study of conditions previous to planting will save a large amount of inconvenience, labor, expense and regret later on. Apple and Pear trees take about six years to come into bearing, but after that the crop increases annually. Pruning will accelerate fruit production to a large extent and providing a good selection of varieties has been made, it is possible to have Apples nearly every month in the year, the proper facilities being available for Winter

storage. Good cultivation is beneficial to the growth of fruit in general and liberal treatment will increase results.

Following is a table showing how many trees or plants may be planted on an acre at various distances apart:

Feet apart	Number of trees	Feet apart	Number of trees	Feet apart	Number of trees
40.....	26	16.....	170	6.....	1,210
35.....	34	15.....	194	5.....	1,744
30.....	49	14.....	224	4.....	2,722
25.....	70	12.....	304	3.....	4,840
20.....	109	10.....	435	2.....	10,890
18.....	135	8.....	680	1.....	43,560

It has been thought unnecessary to include, in a book of this nature, a large number of varieties, but rather to give the names of kinds that have been proved of real merit, and while those mentioned are not all of the good ones, they have been selected for their superiority in vigor and production. Recent introductions have not superseded many of the old and tried varieties which have become so well known as standard in all the essentials of color, size and quality.

APPLES

These do best in a rich, loamy, well drained soil, in a position preferably facing the east or southeast. This situation protects the trees from north and west winds and retards blooming in Spring, thereby often preventing the destruction of the blossom by late Spring frosts, and the consequent failure of the crop. In planting, select a three-year-old tree, which can be procured at any reliable nursery, and insist on this being true to name, because a mistake at this point means years of disappointment. Do not make the common mistake of planting your tree in a small hole, or planting too deeply, but be liberal in all your treatment and your tree will respond accordingly. Prune all broken and damaged roots, and after spreading the remaining roots evenly in the hole, cover with fine earth and give the tree a slight shake. Allow the earth to sift down among the fine roots, then put on more soil and tread in firmly, finish filling the hole, and put on a generous mulching to keep the soil about the tree moist, for upon this mulching often depends the life of the tree. After the tree is firmly planted, prune in the head to five or six branches and reduce these to half their original length. Attach a label to the tree and it is ready to take a permanent place in the garden.

During its first season of growth all superfluous shoots should be cut out, keeping in mind the future form of the mature tree. The

second season the previous year's growth should be cut back about half, and after this the tree will usually need only thinning out the center and such shoots as cross each other, to secure abundance of light and sunshine. The shoots which come out of the stem should be rubbed off as they appear. This treatment applies particularly to



Typical half standard Apple tree suitable for the amateur's garden

standards, which should be planted at least 25 ft. apart. In a small garden trees known as pyramids, cordons, and espaliers may be grown with success. These can be purchased in that form, and are used for covering arches or for growing against buildings, walls or fences. They are specially grafted on roots which have a tendency to retard

growth and possess the advantage of producing fruit quicker than standards and in taking less space in which to grow, a consideration where room is limited. Pyramids could be planted in a row 10 ft. apart, cordons 3 ft. apart against a wall or to form an arch over a walk, and espaliers along each side of a walk or against a wall or building, thus making the most of restricted space. Their pruning is more severe and may be done in July and in Spring, the production of fruit bearing spurs being the end in view.

The prevention of San José scale is necessary to success, and a spraying with any good insecticide sold for that purpose should be made in the Spring; lime and sulphur mixture treatment is very good or an application of one of the oil sprays is effective. Consult the entomologist of your State Experiment station as to materials and time of application. Then the familiar codling moth has to be dealt with. Arsenate of lead, one and one half pounds to fifty gallons of water, sprayed through a fine nozzle, has proved the very best treatment for this pest. Usually one and one quarter gallons of lime sulphur solution is added to this spray for protection against scab. The trees should be sprayed as soon as possible after the blossoms fall, the object being to get some of the insecticide into the calyx before it closes up tight, or the fruit turns downward.

Another spraying is necessary for fungous growth on the fruit. This should be done with arsenate of lead and lime sulphur as in the previous spray as soon as possible after the woolly down begins to come off the young fruit. No particular time can be stated, as in different localities the season varies. If green or black aphids appear on the growth of the young trees, what is known as "Black Leaf 40" is the best remedy. It is a preparation of nicotine in a concentrated form, and should be used according to directions supplied with each can.

Apples are seldom propagated except in nurseries, where large quantities are raised from seed and the many varieties in demand are then grafted on these seedlings while they are quite small. Grafting is sometimes practiced in gardens for introducing a new variety on an old or objectionable kind.

In giving a list of varieties, due attention has been paid to sorts designed to keep the family supplied for a greater part of the year. In almost every locality, there are varieties which do particularly well, and which are general favorites; because of this fact, it is always well before planting, to inquire from some of the older settlers, whom you know raise good fruit, what special variety succeeds best with them.

The following list, however, covers a wide range, and the varieties named are adaptable for general planting. Make a selection for early, medium and late.

EARLY HARVEST. Fruit pale yellow, tender and good. Bears early. Late July and August.

RED ASTRACHAN. Fruit largely covered with light and dark red. A good early, and bears young. August and September.

SWEET BOUGH. Fruit greenish yellow. The best early culinary variety. August and September.

DELICIOUS. A fine red Winter variety.

DUCHESS OF OLDENBURGH. Fruit red striped, crisp, tender, juicy, aromatic. A good culinary variety. Late August and September.

GRAVENSTEIN. Fruit yellow striped, good size, attractive appearance, excellent quality. September to November.

TOLMAN SWEET. Fruit pale yellow, decidedly sweet. A good dessert Apple. November to January.

MAIDEN'S BLUSH. Fruit lemon yellow with crimson cheek; very attractive. September to November.

SUTTON BEAUTY. Fruit attractive, red, fine grained, crisp. A good dessert Apple. November to March.

RHODE ISLAND GREENING. Fruit green. The very best culinary Apple. October to March.

BALDWIN. Fruit red. The well-known Winter Apple. October to May.

NORTHERN SPY. Fruit splashed with red; very crisp; of fine flavor. December to June.

WAGENER. Fruit red, large, subacid. An Apple of superior excellence. October to March.

SIBERIAN CRAB. The Crab Apple furnishes a most delightful jelly; none better. It is also ornamental and might be planted where non-fruiting trees are planted now. Other Crab Apples are Golden Beauty, Hyslop, Martha and Transcendent. September and October.

SPITZENBURG. Fruit red. Winter.

McINTOSH. Fruit bright deep red; flesh white; juicy, with slight acid flavor. September to January.

STARK. Fruit large, round, greenish yellow, with red stripes; flesh yellow, mildly acid. November to January.

WILLIAMS. Fruit rich dark red; large, with tender crisp white flesh. July to August.

APRICOTS

The delicious Apricot should be grown in every garden. Bush plants are preferable, as being a very slow growing tree, it requires little pruning, except for the purpose of keeping it in shape. Flowering early it is subject to injury by late frosts, but the fruit sets much better in a cool temperature. Two varieties should be planted near each other to assist pollination.

Culture and treatment the same as the Peach. The varieties are few, but the very best are:

MOORE PARK. Rich orange color, the best, ripening in August.

HARRIS. Deep golden yellow. July.

BLACKBERRIES

The culture of Blackberries is similar to the directions given for Raspberries. They grow stronger, however, and require more room, and owing to their sharp thorns they are not so desirable in the small garden. Some object to the many seeds they contain, particularly if grown on poor soil, but a few varieties are almost seedless:

ELDORADO. Sweet, without hard core.

JOY. Midseason, of large size; fruit black; canes strong and hardy.

BLOWERS. A popular variety; large, glossy berries; ripens early.

CHERRIES

Cherries are enjoyed by all; even the birds love them, but as they grow in such abundance there are usually enough for all. Early Cherries are a great temptation to birds, and a slight protection with mosquito netting may be a necessity. The sour Cherries come later and need no protection. Cherries are not particular as to soil; they do well in a good sandy loam.

Black aphid always attack Cherry trees and the ends of the new growths are frequently covered with them, but a good hard spraying with Black Leaf 40 will usually clean them off. This should be applied as soon as possible just before bloom. Cherries mature quickly and their season is short.

This list of varieties include the favorites:

GOVERNOR WOOD. Light yellow and red. June.

BLACK TARTARIAN. Large purple. June.

MAY DUKE. Large red, juicy. Early June.

BIGARREAU. One of the best. July.

CURRANTS

Currants are used principally for culinary purposes, and unless wanted for preserves, a few plants will generally be sufficient for ordinary use. The red and white varieties are the ones usually grown, but some like the black, and a few of these should be included. The reds are the most popular but they all make delicious jelly; the black particularly so. Served on the table freshly picked, the white and red, mixed, make an appetizing dessert.



Standard (or tree) Red Currant

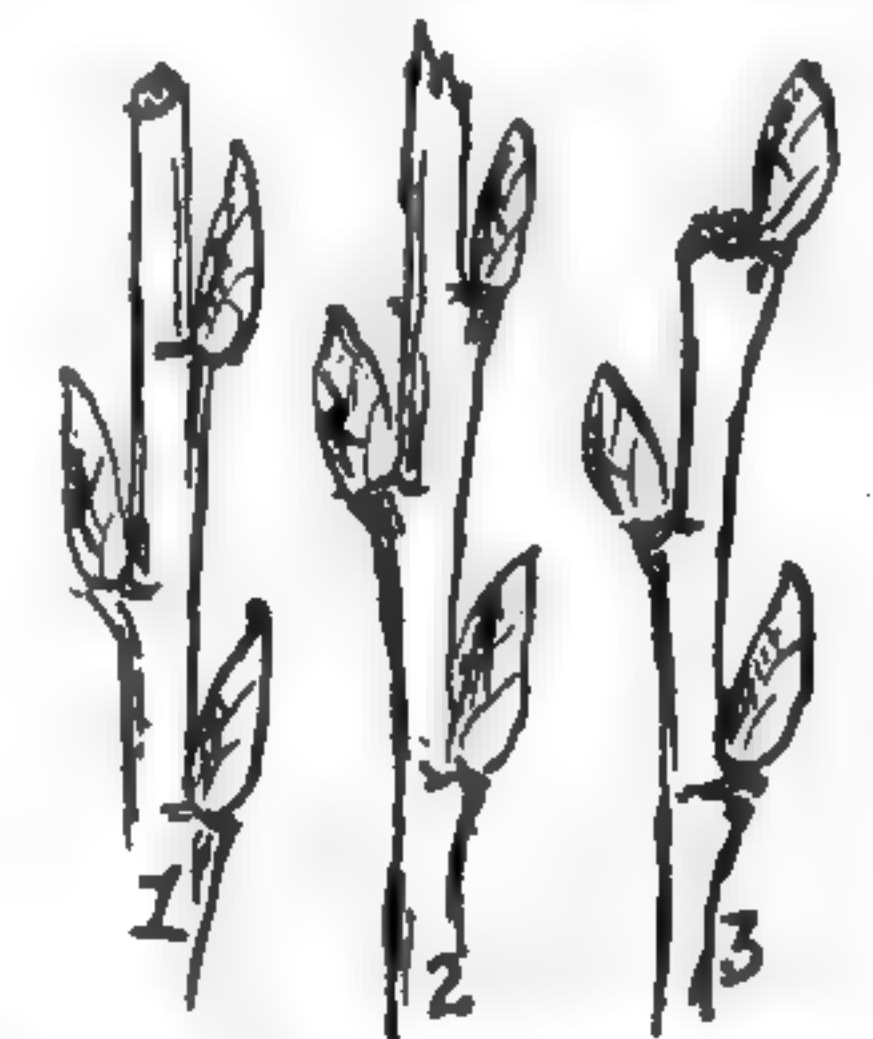
This form of bush has special merits, being ornamental as well as utilitarian

of the bushes, otherwise they will get too thick and small fruit will result. Standards are in every way preferable as they can be easily pruned and the fruit is kept up out of the dirt, a great advantage on sandy soils.

If planted 4 ft. apart they will soon grow up and fill the space between each plant. As Currants admit of hard pruning, they may be used for bordering garden walks, or planted against fences to utilize space, where this is a consideration.

The Currant worm is one of the worst pests we have to deal with. Powdered hellebore dusted on the plants is a good remedy, but they should be watched for carefully as

Any soil of a medium rich nature will grow good Currants and they are not particular as to situation. They prefer a light, open space preferably to one that is shaded by trees. They may be planted in Spring or Fall, and must be attended to in the matter of pruning to insure a good crop of fruit annually. All young shoots should be pruned back about half, and only a few left to form the bush, care being taken annually to remove all young growth which springs from the base



Pruning Currant shoots

1. Twig should be cut back to bud as shown in Fig. 3. No. 2 shows torn snag

soon as the foliage appears, and kept destroyed until the foliage becomes hard. Ordinary road dust, air slaked lime, or any fine dust, has been used successfully in destroying the Currant worm, but it should be applied quite early in the morning, or late in the evening when the foliage is damp with dew; it is then very evenly distributed and most effective. There is some danger in using a liquid insecticide because the fruit is small and it is almost impossible to wash off all traces of poison.

Currants are usually propagated from cuttings made of the ripened shoots, and root quite freely if put in during the Fall. The best varieties are:

Red.—FAY'S PROLIFIC. Sweet, large and very productive. CHERRY. Large and very prolific. POMONA. A new variety; keeps long after getting ripe. WILDER. Bright red; vigorous.

Black.—CHAMPION. Berries large, of good quality. BOSKOOP GIANT.

White.—BAR-LE-DUC, WHITE GRAPE.

DEWBERRIES

These follow Strawberries in ripening and are a welcome addition to the list of early fruit; delicious, and superior to Blackberries. The vines should be tied to a wire for support and to facilitate gathering the fruit. The young growths spread on the ground and, after fruiting the old canes should be cut out and the young growths tied in their place and thinned to prevent overcrowding. The same treatment required as for Raspberries.

LUCRETIA. The best variety; fruit large and handsome.

GOOSEBERRIES

This luscious fruit is not much grown, but serves a purpose as a culinary fruit. It makes a good subject for planting between plots, as a fence, or along walks, as it can be pruned hard and kept within limits, trained on a wire fence for support. Planting may be done in the Fall and a crop of fruit can be had the first year. Very little pruning is required, as the plants usually grow short jointed wood, and keeping the plants thinned out so that the fruit may have exposure to the sun and air is all the pruning necessary. Like Currants, the Gooseberry is subject to the attack of worms (caterpillars), which soon denude the plants of foliage and make them unsightly, as well as preventing the proper maturity of the fruit. Dusting with powdered hellebore is one of the best remedies and should be applied as a preventive as soon as the foliage expands. Mildew often attacks the Gooseberry and causes

trouble, but spraying with a solution of sulphuric acid, one part to one thousand parts of water, will control this disease. It may be borne in mind that eight teaspoonfuls make one fluid ounce, 16 ozs. make a pint, and there are eight pints in a gallon. A teaspoonful of sulphuric acid to a gallon of water is therefore a safe amount.

Propagation of the Gooseberry is done by cuttings of the ripened shoots. The following varieties are each good:

DOWNING. Large, pale green, soft and juicy; quite prolific.

INDUSTRY. Large, dark red; good cropper.

RED JACKET. Large, red, good flavor.

WHITE LION. One of the finest.

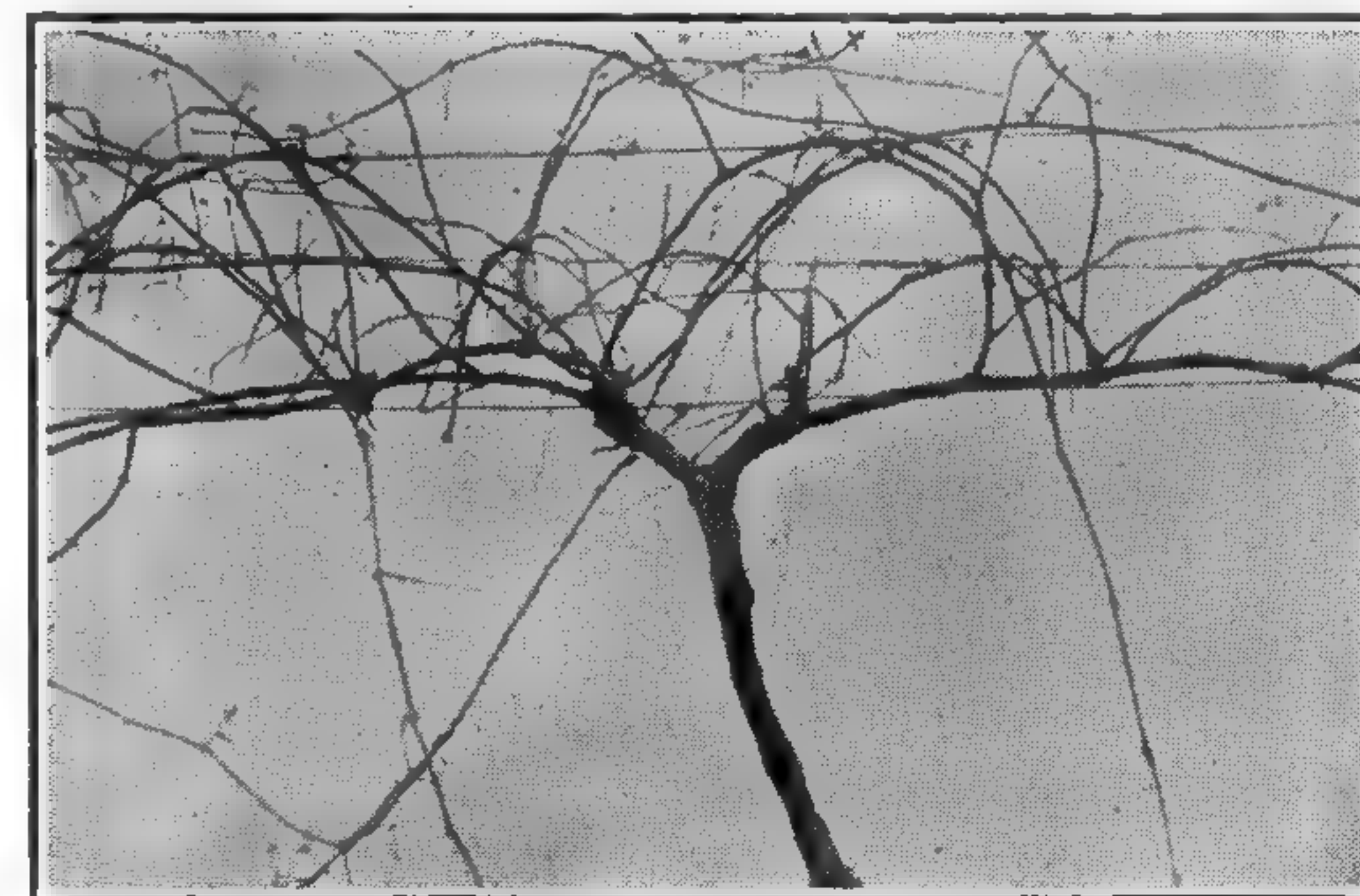
GRAPES

Grapevines may be trained on arbors, pergolas, fences, buildings or trees, but to secure the most and the best fruit trellises are desirable.

The simplest trellis is the Munson or canopy. Erect it as follows:

Set end posts, preferably of locust or red cedar, 5 in. in diameter at their bases so as to be below the "frost line." Place others, 3 or 4 in. in diameter, 24 to 30 ft. apart in the rows. Saw the tops off square at 4 to 5 ft. above ground. Bore a small hole 6 or 8 in. below the top of each post for the lowest wire (size No. 11) to pass through. Spike or wire on crosspieces of 2 by 4 scantling 24 in. long on top of the posts. An inch from their outer ends saw a slot half an inch deep for the other two wires to rest in. Fasten the ends of the wires firmly to one end post but loosely to the other so they may be loosened in Winter and tightened in Summer. The trellis will not be needed until the vines are a year or two old.

When the vine is planted cut off all side shoots and reduce the main



Munson System of Grape Training
Vine unpruned. Courtesy Kentucky Experiment Station

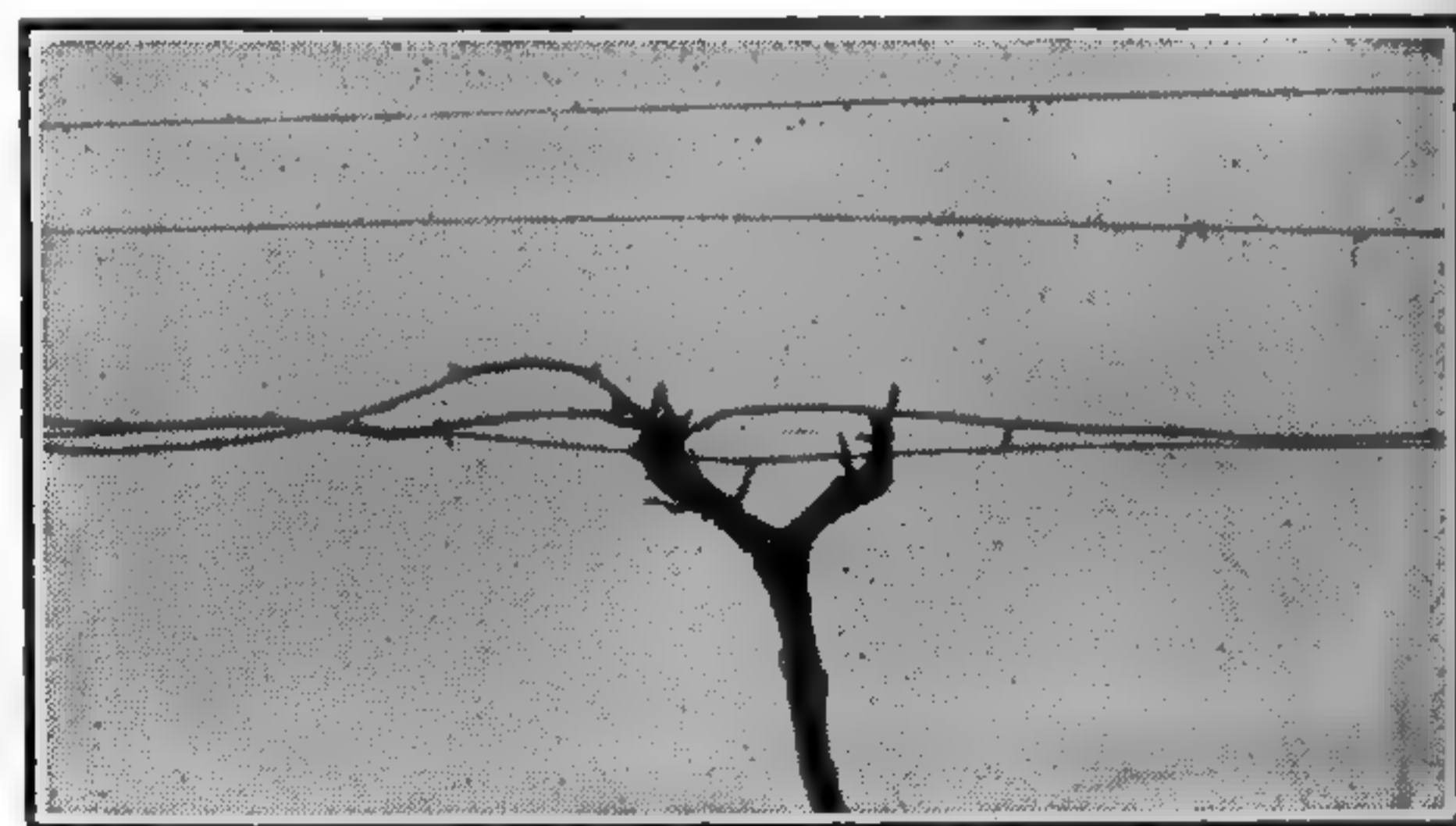
cane to two or three joints, each with a plump bud. When young shoots develop tie them to stakes 5 or 6 ft. tall. Tie again during Summer when necessary to keep the vines off the ground. In mid-Winter cut off all side shoots. If the main cane is weak cut it back to 15 to 20 in.

and manage as the first season. If it is sturdy, tie to the lowest wire of the trellis and cut off all above this wire. To steady the cane, coil a stout cord around it two or three times in a spiral and fasten to the base of the vine and to the wire. When growth starts in Spring, destroy all shoots except those from the uppermost two buds. Train these in opposite directions along the lowest wire. Better not allow any fruit to develop this year so the two "arms" will become very strong. Allow no shoots to develop below these arms on the main trunk.

In the second mid-Winter cut off all side shoots and shorten the arms or main canes to 4 to 8 joints—few for weak canes, more for strong ones. Each bud will produce a shoot and each shoot should bear one to five clusters of grapes. As the shoots grow, raise their ends and let them hang over the upper wires. They do not need to be tied. Before the blossoms open decide upon two sturdy shoots to form next year's arms. They should start near the trunk. Pinch off all clusters of fruit on them to make them strong. At the same time shorten each of the other shoots to two or three joints beyond the outermost clusters. In a couple of weeks go over the vines again and cut back to one or two joints those shoots missed the first time, also growths that have started in the meantime.

In the third mid-Winter cut each of the main arms an inch or so above the two sturdy new arms developed previous Summer and remove them and all their shoots from the trellis. Take care not to injure the two new arms in doing this work. Shorten these arms to four to eight or ten joints. Gently braid each with the lowest wire to right and left, respectively, and tie firmly in two or three places to the wire. During the growing season proceed as in the previous Summer, except that from the third year forward you may allow three or four arms to develop instead of two on strong vines.

Grapes delight in a well drained rich soil. Old bones are excellent to place beneath the vines before planted. Clean cultivation is desir-



Munson System of Grape Training
Vine pruned. Courtesy Kentucky Experiment Station

able. Set strong growing Northern varieties 10 ft. apart, small ones 6 or 8 ft. Southern kinds often need 20 ft.

Good Northern black varieties are: Sheridan, Worden, Barry, Wilder, Moore's Early and Concord. Red ones: Agawam, Brighton, Brilliant, Delaware, Jefferson, Salem, Vergennes and Catawba. White: Dutchess, Empire, Goethe, Winchell (or Green Mountain) and Diamond. Popular Southern varieties are Scuppernong, James and Herbemont.

LOGANBERRIES

A few plants of the Loganberry may be grown as a useful novelty. The fruit has a very flat taste, but looks very pretty as a dessert, on the table. There should be no reason why this easily cultivated fruit, which was raised by a Judge Logan in California, should not be tried in many gardens. In England it has become a general favorite. Its treatment in all respects is similar to that of the Raspberry.

MELONS • See Vegetable Garden, Chapter XIX

PEACHES

To those in the warmer parts of the country where the Winters are not too severe, a few Peach trees will add much to the revenue of the garden, and who does not like Peaches? They can be served in so many appetizing ways. The Peach is not a long-lived tree, and will not produce profitably for more than five or six years. After the fruit begins to get small, new trees had much better be planted.

Peaches thrive in a light, well drained soil and preference should be given to a northern aspect, as this tends to retard the date of flowering and prevent a total loss of the crop which would result if subjected to a freezing temperature while the trees are in bloom. At best Peaches are a precarious crop unless well protected from cutting winds. During Winter, if the temperature falls to ten degrees below zero, the blossom buds will generally be killed although in a dormant state, and no fruit can be expected under such conditions. Peach trees come into bearing early, and for this reason young plants should be selected for planting and careful attention given to pruning to get the tree into shape.

Early Fall is the best time to plant, as the trees have a chance to get rooted a little before the ground becomes severely frozen. The roots being very fine, the trees should be planted as near the surface as consistent with firm and secure planting, and a stake put at each

tree, if necessary, to prevent its moving. Peaches like the ground around them cultivated, and much better fruit will result.

They require little pruning except to cut back strong growths, and to thin out if the branches become too crowded. Dwarf standards are preferable, but in small gardens trees can be trained against a building or on a fence. Under this method of culture they produce fine fruit, and ripening is assured in unfavorable seasons.

A spraying with some sulphur spray will check any tendency of fungous growth if done while the leaves are quite small; if done after the fruit gains size the woolly down which covers it holds the spraying solution and may cause some disfigurement. Aphids usually attack the young leaves and if planted against a wall frequent severe syringing with force enough to dislodge the insects will keep them in check. A solution of nicotine may be used effectively against this black aphid, but is almost sure to leave a stain on the fruit and should not be applied in any case after the fruit is half grown.

Early varieties are the best to plant as the season is none too long for the maturing of the fruit.

New varieties are raised from seed and their perpetuation is secured by budding. This is done when the stock is quite small and usually close down to the ground.

The best kinds are those which are known to do well in particular localities, but those named are known to be generally good, and can be safely recommended, and are all freestone varieties:

ALEXANDER. Medium size, white flesh, rich flavor. July.
 BELLE OF GEORGIA. Large, showy, red cheek; flesh white, firm and sweet. August.
 EARLY CRAWFORD. Large, yellow, of good quality. Early September.
 HALE'S EARLY. Melting and rich flavor. August.
 ELBERTA. Large, yellow with red cheek; of fine quality. September.
 CHAMPION. Very large, white flesh; very productive. August.

PEARS

Successful Pear culture is only practicable where the condition of the soil permits a free growth of wood. The trees may be planted closer together than in the case of Apples, because the tendency of the Pear tree is to grow tall rather than to spread out. Where an Apple orchard is planted, Pear trees may be planted between the rows until the Apple trees require the room, when they should be cut out rather than encroach upon the room allowed for the Apple trees. Pears come into bearing much quicker than Apples, and the trees never assume large proportions. It is well to bear this in mind when planting,

but a small Pear tree will produce liberally, and a careful selection of varieties will give a long season of fruit. Pears delight in a heavy soil, and as they bloom early in the season a sheltered position should be selected where some protection may be had from a windbreak of tall evergreens or group of buildings, or from the natural formation of the place chosen, such as the shelter afforded by a hill. The tree should be planted on the eastern slope when many are to be grown, but in the small garden pyramids or espaliers should be used. These give the best results, yielding a large amount of fruit in a restricted space. Pears respond to good cultivation and will stand closer pruning than Apples. The tall growing varieties should have the heads cut hard to prevent the trees reaching too great a height, which makes the gathering of the fruit difficult. It is good policy, therefore, to keep the trees low and bushy. Pears make spurs freely, and in pruning, this fact should be held in mind. Encourage a free, open, branching habit, and prune to clothe the branches with fruit-bearing spurs, cutting out all superfluous growth at the Spring pruning.

Probably the worst enemy of the Pear is rust and fungus, an attack of which causes the fruit to grow deformed and unsightly. Frequent sulphur sprays will keep the foliage and fruit in good condition. This should be applied immediately after the blossoms fall, and again about three weeks later, and should any sign of fungous growth appear later, another spraying should be given to insure good looking fruit and a clean, healthy growth to the trees.

Pears are usually grafted, and trees can be purchased much more cheaply than they can be grown to a fruiting age.

The following tried and popular varieties will prove a valuable addition to the garden:

CLAPP'S FAVORITE. Large, pale yellow; flesh fine, juicy and buttery. August.
 BARTLETT. A very popular variety; large, shapely, melting; luscious flavor. September.
 SECKEL. Fruit small but very sweet and melting. One of the best.
 KIEFFER. Large; golden yellow when ripe; juicy, with Quince flavor. October and November.
 SHELTON. Large; russet and red; aromatic flavor; rich and delicious. October and November.
 BEURRE D'ANJOU. Large and handsome; flesh melting, extra fine. November.

Pears should be gathered as soon as the seeds are black, and stored in a dry, airy room until fit for use.

PLUMS

No garden is complete without a few Plums, so useful for table

and culinary purposes. The Japanese Plums are wonderful bearers, and produce annually large quantities of fruit. Their abundance makes it necessary to thin out the fruit to prevent rotting in clusters on the branches. Plums are not particular as to soil, as their roots spread so much nearer the surface than Apples or Pears, and any fairly good loamy soil that is well drained will produce fine fruit, but cultivating around the trees is very beneficial. Plant early in the Fall; be liberal with the spade, make large holes, spread the roots out evenly, and plant firmly.

Plums should not be pruned except for conserving the shape of the trees, particularly the Japanese varieties, which usually grow very strong the first season, and pruning back is a temptation, but if pruned they only produce another strong growth. If left alone they will form fruit buds all along these strong growths and so check excessive vigor. Plums are the earliest fruits to flower, and a sheltered position should be given them, or plant them on a Northern exposure where the buds will be retarded until danger of freezing is past. Spraying to be effective, should be done very early, and again as soon as the blossoms fall, because the fruit is eaten without removing the skin. Plums intended for the table should be allowed to ripen fully on the tree, but for preserving and culinary purposes they may be gathered earlier. Should Plums insist on making a strong, rank growth, the best remedy is root pruning. Lift the trees in the Fall and shorten back all strong roots, keeping the roots exposed as short a time as is possible to complete the work.

Some plums can be raised successfully from seed, the Greengage being one of these; but they are usually budded or grafted on the wild Plum stock.

The curculio is the worst pest we have to deal with, and the only way to fight this insect is to gather up all the fruit which falls prematurely and burn it, as in these fallen fruit the larvae remain until full grown, when they eat their way out and enter the ground, where they change into the pupa state. The full grown beetle emerges in about four weeks and hides under the bark of the tree or some other protection until Spring business opens up.

Another insect which sometimes causes trouble is aphis. Spraying with a nicotine solution will destroy this pest, or the tops of the young invested growths can be cut off.

Some of the very choicest Plums for eating are:

OULLIN'S GOLDEN GAGE. Large, delicious flavor. August.
 TRANSPARENT GAGE. Very large, round, juicy and rich. July.
 GREENGAGE. Medium size, round, green, rich. August.
 COE'S GOLDEN DROP. Very large, golden yellow, rich flavor. September.
 VICTORIA. Large, oval, red. Useful for every purpose. August.
 MAGNUM BONUM. Large red. Good culinary variety. September.

For culinary purposes:

ABUNDANCE, BURBANK, RED JUNE, SATSUMA and WICKSON.

QUINCES

A few Quinces are desirable in the small garden, and a tree or two will usually produce sufficient fruit for the average family. Not being an edible fruit, it is used only for canning purposes, and makes the most delicious jelly, with a flavor all its own.

In variety there is not much choice, but that known as APPLE or ORANGE produces large, roundish fruit, of a bright golden color, and is very productive, even when quite small. CHAMPION, a good yellow, prolific.

They are best grown in bush form.

RASPBERRIES

The popular Raspberry is always welcome in the home, and only when freshly gathered has it that lovely flavor peculiar to this fruit which makes it so desirable in the home garden. Raspberries must be handled with the greatest care or the fruit will become bruised and soon ferment. Small baskets should be used when picking, to prevent excessive weight, which invariably crushes the tender berries, and they soon become unfit for use.

The plants are not particular about the kind of soil they grow in, nor the location. They grow best in a good, rich, well drained, loamy, cultivated garden soil, and should be planted in rows 2 ft. apart and 4 ft. between the rows. They are best tied to a wire trellis for support and to facilitate ease in gathering the fruit.

The young growths which spring from the base of the plants, should be thinned out to four or five, and after the season's fruit is over, the old fruited wood should be cut out close to the ground, and the young shoots given every chance to ripen before Winter sets in, when they may be tied together in bunches of five or six canes and left in this way until Spring, when they must be tied to the wires and trimmed evenly along the top to make them look neat.

Raspberries are not subject to much trouble from insects or diseases.

They are propagated by division of the roots or from cuttings, which should be taken from the ripened shoots and inserted in the ground in September, and will commence to grow the following Spring.

There are red, yellow and black Raspberries, but the red varieties are the most popular. A few well tried varieties follow:

CUTHBERT. Red, large and sweet; the most popular of all Raspberries.

BRANDYWINE. A large, bright red berry; a good cropper.

GOLDEN QUEEN. Large, amber color; fine quality.

CUMBERLAND. Very large, black, glossy berries, juicy and sweet.

LATHAM. Red; hardy.

ST. REGIS. Very early fruit, crimson and solid; hardy.

WHITE QUEEN. Extra large berries free from acid.

STRAWBERRIES

No garden is complete without Strawberries, and as they are so easily grown, no garden should be without them. What is nicer than a dish of Strawberries picked fresh from your own garden? Strawberries like a rich soil and well repay a very liberal application of fertilizer. The best time to plant a bed is in September, when the young plants are just ready. Select an open piece of ground away from tall trees or shrubs; dig in a liberal dressing of well rotted farmyard manure, with a sprinkling of bonemeal, and in this plant your Strawberries 1 ft. apart in the rows and 2 ft. between the rows.

After the first hard frost throw over them some light protection—straw, old hay or anything that will not be liable to pack down on the plants too tightly. The object of this covering is not to keep the plants from the cold, but to protect them from the sun, which causes more failures than the cold. This covering should be removed after Spring opens up, but not too early, as a little growth may have already started, and if exposed to a late frost may cause much injury. The plants which will have become loose by the action of the frost, should be gone over and



Good Sized Strawberries

firmly pressed into place, the beds lightly forked to prevent the growth of weeds, and when in bloom, straw or salt hay should be placed between plants to prevent the soil from splashing on the ripe fruit.

To lengthen the season of fruiting, the first blossoms may be picked from some of the plants, and these will fruit about three weeks later. Strawberries are sexual and bi-sexual, that is to say, in some the flowers have pollen and seed organs, in others only one set of these. To insure fruiting it is necessary to plant some of each kind, unless the bi-sexual varieties alone are selected. A bed once planted is good for at least three years, when it should be renewed. If at all possible start a new bed one year before the old bed is to be destroyed.

All runners should be cut away annually as soon as the fruiting season is past, unless some are wanted to make a new bed, in which case the strongest plants should be left until wanted and the runner should be stopped at the first strong plant to accelerate rooting.

Strawberries, fortunately, are not troubled with many insect pests or fungous diseases, and their propagation by runners is very simple, as they root freely of their own accord and can be cut off and planted where they are to remain.

There are many fine varieties and their selection is largely a matter of preference. The following are bi-sexual and are all good, tested sorts:

Early.—CLYDE, MARSHALL, BEDERWOOD, JERSEY GIANT (early and very productive), BUSHEL-BASKET (fruit of fine quality).

Mid-season.—ABINGTON, MCKINLEY, SHARPLESS, NICK OHMER.

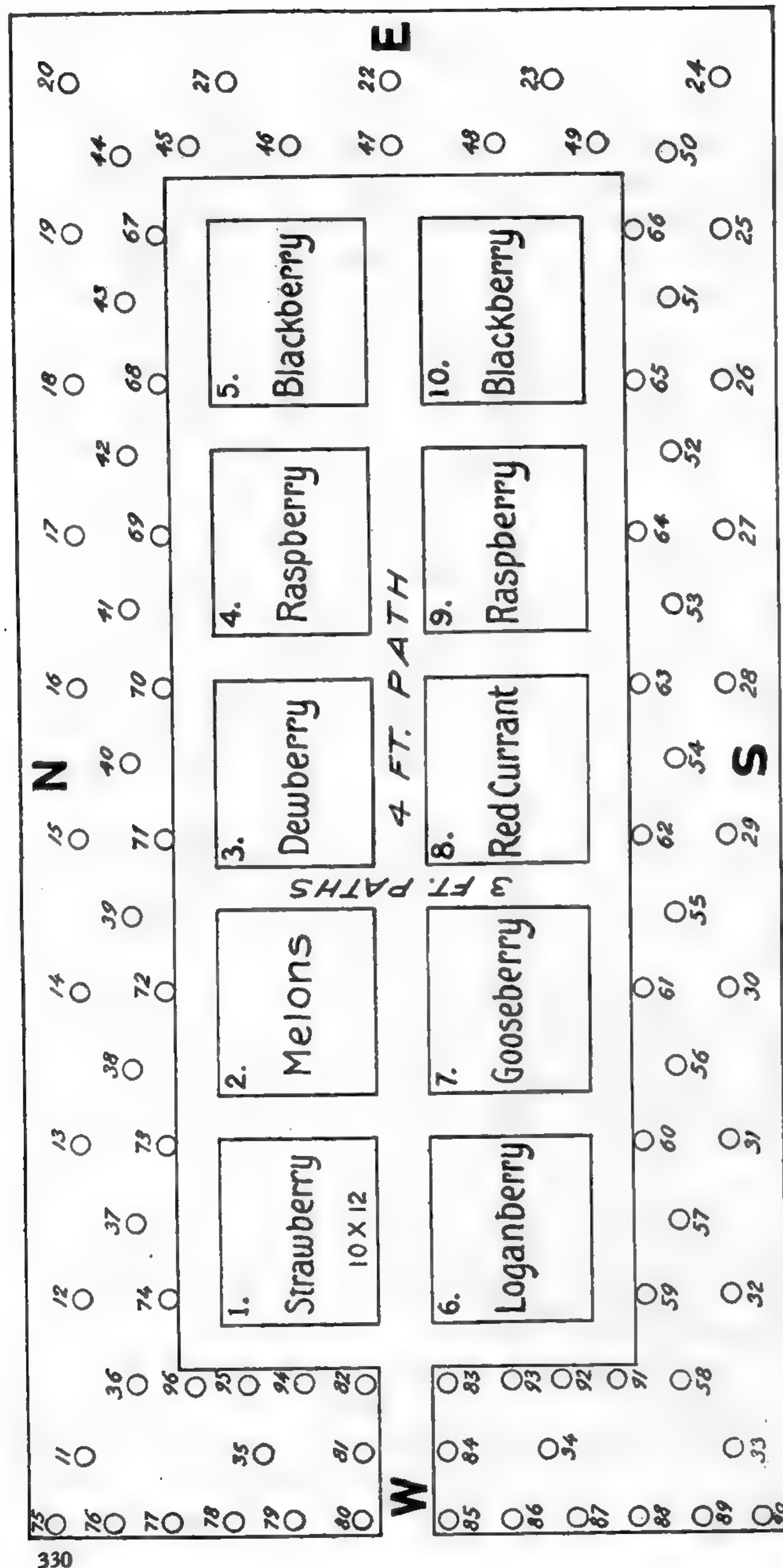
Late.—COMMONWEALTH, GANDY, BRANDYWINE.

Autumn or Perpetual.—AMERICUS, PROGRESSIVE. These have small fruit and very little of it. To give results they must have extra care.

PLAN FOR AN IDEAL FRUIT GARDEN

On page 330 is shown a diagram of a fruit garden, prepared for the readers of "Garden Guide" by Alfred J. Loveless, one of the best known and most successful garden fruit growers in the United States. This fruit garden has been carefully laid out so as to get the maximum amount of fruit from a minimum of space.

The garden embraces an area of 50x100 ft. scaling. If it is not possible to give this much area to a distinctively fruit garden, it can be modified to fit requirements. The one thing essential is to study the plan and the descriptive matter which follows so as to arrive at the arrangement by species. The reader can then modify the plan to suit his own requirements.



Plan for an Ideal Fruit Garden—By Alfred J. Loveless

There is no fence or wire around the 10 by 12 ft. plots, but Raspberries, Blackberries and other plants should be staked and tied, as told in cultural directions. The outside of the fruit garden may be surrounded by a wire fence but that is not necessary; if one is erected—cordons and espaliers should not be trained against it, as the larger (standard) Apples and Pears would cast too much shade. Tomatoes could be profitably trained to such a fence until the shade became too dense. The area is 50 by 100 ft. The scale is slightly less than $\frac{1}{4}$ in. to the foot. On page 332 we illustrate methods of growing fruits in espalier and cordon form. These methods are particularly desirable where area is limited.

FRUIT FOR THE SMALL GARDEN

Of one thing you can rest assured, which is that if you follow the instructions given all the way through this chapter you will have a fruit garden second to none.

The ten squares in the center represent areas 10x12 ft. each. No. 1 is devoted to Strawberries; No. 2 to Melons; No. 3 to Dewberries; Nos. 4 and 9 to Raspberries; Nos. 5 and 10 to Blackberries; No. 6 to Loganberries; No. 7 to Gooseberries; No. 8 to Red Currants. These will stand variation to meet requirements.

Key to area surrounding the center ten sections:

11 and 33	Quince
12-14-16-18	Standard Apples
20 and 24	Crab Apple
13-15-17-19	Bush or Pyramid Apples
21-22-23-34-35	Cherries
25-27-29-31	Standard Peaches
26-28-30-32	Standard Plums
36 to 44	Bush or Pyramid Pears (9)
45 to 49	Espalier Apples (5)
50 to 58	Bush Peaches and Apricots (9)
59 to 74	Cordon Apples, double or single, trained low on a single wire (15)
75 to 90	Grapes (16)
91 to 96	Standard Currants (6)

GROWING AND TRAINING CORDON AND ESPALIER FRUIT TREES

[Growing fruit trees in these shapes is an endless source of delight to the gardener and we recommend giving the art a trial if only commenced with a few trees, their first cost being but a trifle and the reward great.]

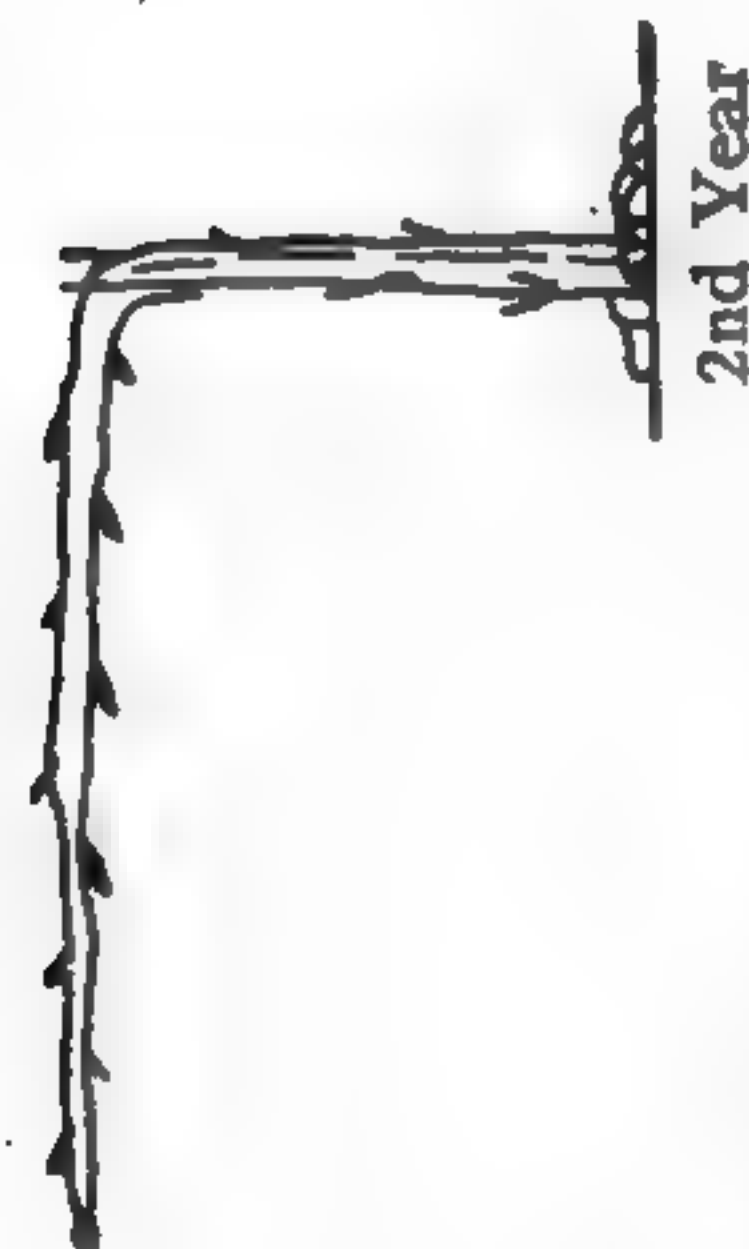
Cordons and espaliers are not difficult to train and, by following the diagrams shown on page 332, splendidly grown specimens can soon be obtained. Sometimes a young tree can be bent down to form a single cordon, thereby saving a season's growth, but a double cordon would have to be formed the first year as shown in the diagram.

A single galvanized wire, anchored firmly at each end, and drawn tight, standing 1 ft. above the ground, is necessary to support the cordon, the height being a matter of choice, as the tree can be started at any height desired. Should the young tree make very strong growths these should be shortened back in Spring and carefully watched and tied to ensure a straight branch when new growth commences.

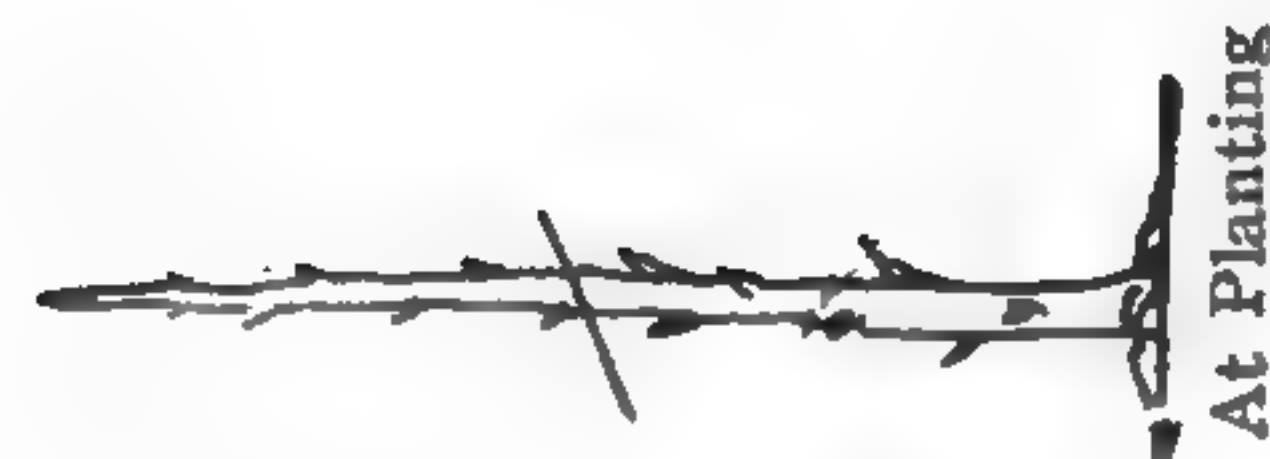
All side growth should be pinched back in June or July, leaving three or four leaves; these will form the fruiting spurs later. The spurs should not be allowed to crowd or weak growth will result. The trees



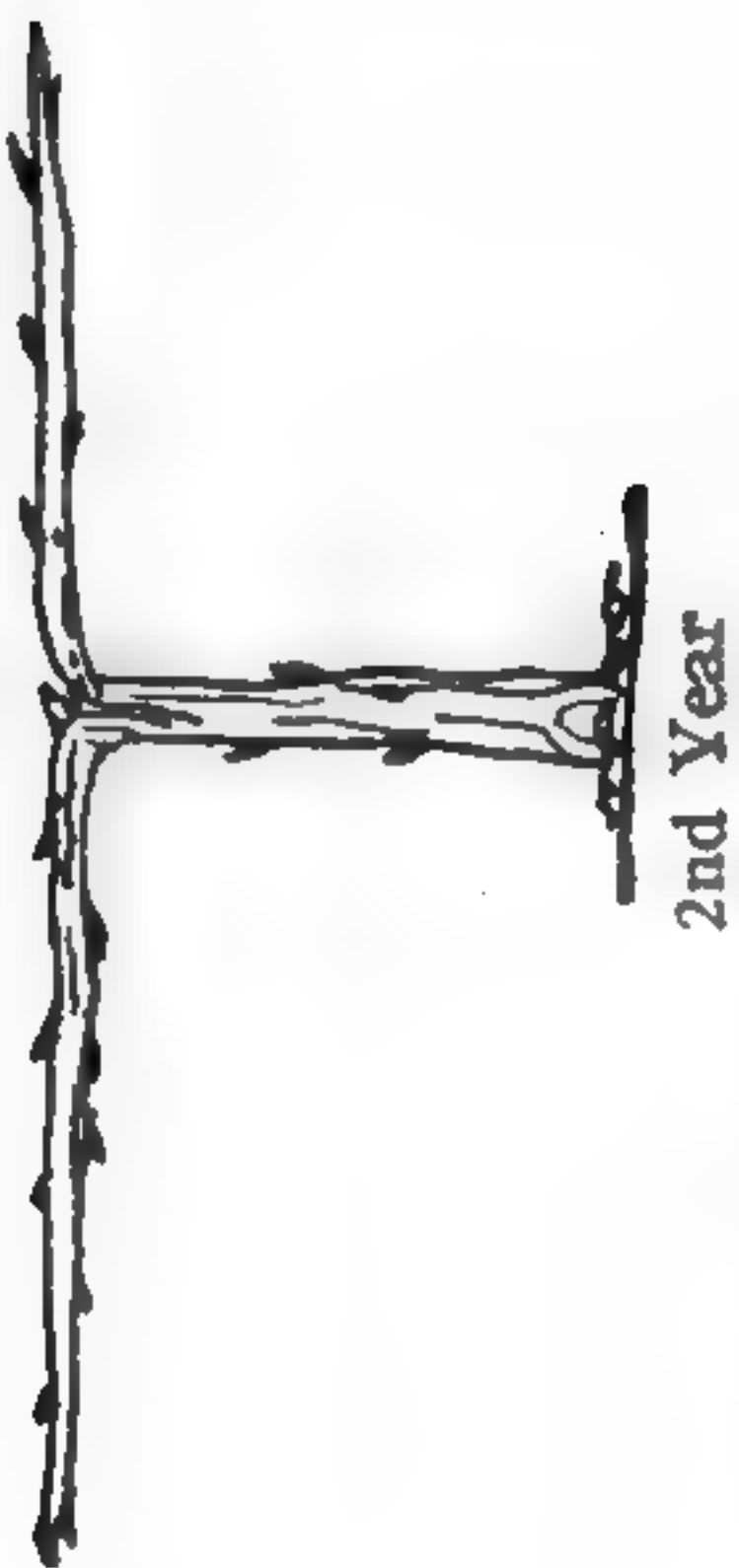
At Planting



2nd Year



At Planting



2nd Year

Double Cordon



3rd Year



4th Year

Evolution of the Espalier Trained Tree

Prune as shown; remove weak growths. In June pinch back all side growths to the fourth leaf to hasten the formation of fruit-bearing spurs.

can be allowed to reach each other and are easily kept within a restricted space. They come into bearing early and produce fine fruit.

An espalier is an amplified cordon, the treatment being identical in the first stage. Branches at equal distances up the stem look best, and three good growths must be encouraged at the first pruning, two for lateral branches and one for a continuation of the main stem; these should be tied, allowing a little play so as not to kill the growths, and kept straight, as the future appearance of the tree depends upon it.

The third year spurs will begin to form on the lowest branches, these should be treated the same as those on the cordons. Fine fruit will reward the labor bestowed upon them.

Upright or oblique cordons consist of a single stem, allowed to grow slowly by cutting back a portion of the matured growth each year in order to encourage the formation of fruiting spurs at close intervals all up the stem. The side shoots should be treated same as for single or double horizontal cordons, but a straight leading shoot must always be assured for the continual development of the tree.

These may be planted 2 ft. apart, against a fence, building, or wall, or to cover an arch in the fruit garden.

Espaliers may be trained on ordinary garden stakes, 4 to 5 ft. high, placed 1 ft. apart; or, iron rods may be used, or an ordinary piece of wire fence, in fact any material that will keep the young growths in the proper position during training.

For Fruit Troubles, see chapters on Insect Pests and Diseases.

For a complete work on the subject of Cordon and Espalier Fruit Trees, we recommend

ORNAMENTAL DWARF FRUIT TREES, by EBERHARD ABJORNSEN
Secure this book where you bought your Garden Guide.



Chapter XXII

FRUITS AND VEGETABLES FOR WINTER

By JOSEPHINE WYLIE

Why Can?—Canning Budget—Modern Methods—Steps in Canning: Selection, Cleaning, Pre-cooking, Sirups, Filling, Sealing—Processing—Utensils to Use: Hot Water Bath Canner, Steamer, "Waterless Cooker," Oven, Steam Pressure Cooker—Types of Glass Jars—Testing for Leaks—Tin Canning Outfits—Canning Accessories—Storing—Yields—Recipes for Home Canned Delicacies—General Directions for Pickling—Pickle Recipes—Canning Questions Answered—Time Table

WHY CAN?

THE wise homemaker knows that it is both profitable and taste-satisfying to can the lush, ripe fruits and firm, perfect vegetables from her own garden surplus or from the stalls of the nearby market. Not only is she laying up wealth in good food against the Winter's needs, food ready for the table with only a few minutes' preparation later on; but more important, she is taking out health insurance for every member of her family, for fruits and vegetables are among our important protective foods. Nutritionists are urging a greater consumption of fruits and vegetables because of their vitamin content, their mineral salts, alkaline residues, and the bulk and necessary roughage that they contribute to the diet. They also contribute some calories, some protein, fat, and carbohydrates. It is worth noting in this connection that scientific experiments have proven that there is very little loss of these important food factors in substituting canned fruits and vegetables for fresh.

In regard to the ever important vitamins, detailed research has proven that:

1. Neither fruits nor vegetables lose appreciable amounts of vitamin A in the home canning process.
2. Vitamin B1 suffers some destruction in canning; however, if the fruit or vegetable contained it in abundance in the raw state, the canned product will still remain a good source of this important growth factor.
3. Vitamin B2 (sometimes known as Vitamin G) is scarcely affected by home canning.

4. There is an appreciable loss of Vitamin C except in canned Tomatoes which lose practically none. This very important scurvy-preventing vitamin is not destroyed by heat but by oxidation, so that there is much less loss of Vitamin C in home canning than there is in cooking exposed to the air. In this connection it is also interesting to find that even fresh fruits and vegetables suffer a loss of Vitamin C in storage while there is no evidence of such loss in the canned products over long periods of storage.

A CANNING BUDGET

A canning budget is a good thing because it points out the actual canned foods needs for a balanced diet throughout the year when fresh fruits and vegetables are not in season in the home garden; and it also prevents canning too much of any one thing, which is almost as bad as canning too little, because an over-satiated appetite is apt to lose interest which may grow into an actual dislike and distaste.

The problem of knowing how much to can for the seasonal needs is solved in the following one-person budget. This should be supplemented by at least one fresh fruit and vegetable a day unless Tomatoes are being served liberally:

Product	Amount to Can
Fruits (one each day).....	35 quarts to last 7 months
Tomatoes (2 to 4 times a week).....	11 to 22 quarts to last 8 months
Leafy vegetables (2 times a week).....	6½ quarts
Vegetables other than those stored (3 times a week).....	15 quarts to last 7 months

In order to estimate how much will be required for an entire family, multiply these figures by the number of people who will eat regularly at home during the months mentioned.

If the homemaker in a family of four can count approximately 265 quarts of canned fruits and vegetables apportioned among the different classes of foods, as given in the foregoing budget, she will know her canning job for that year is well done.

MODERN CANNING METHODS

Scientific research into canning practices has shown us which methods are not only safe to use, but also foolproof, thus avoiding a great deal of loss through spoilage that has accompanied home canning in past years.

The following methods are recommended:

Hot Pack Method. This method has very largely taken the place of cold pack canning because it shortens the time of sterilization in the jar or can, insures superior keeping qualities, and practically

eliminates the problem of shrinkage and partially filled jars, as frequently happened in cold pack canning. By hot pack canning is meant filling hot sterilized jars with hot pre-cooked fruit or vegetables (the food product is brought to boiling in either water or sirup and boiled for 5 minutes before packing); or with cold fruits, such as berries, which may be put into the hot jars and covered with a boiling hot sirup. If the old cold pack method of canning is followed, it is a wise precaution to hold the filled jars in hot water, which is brought to boiling with the lids set on loosely, but not screwed down, until the air is driven out of the jars. This gives practically as full a jar as if the products were packed in hot. Where it is desirable to make a fancy pack of either fruits or vegetables for exhibition purposes, this combined cold pack and hot pack method is a good one to follow, because, of course, it is much easier to work out designs and artistic effects with cool than with hot products.

Open Kettle Method. This method should only be used for fruits and our acid vegetable, the Tomato, the so-called easy keepers, because open kettle canning does not give as thorough a sterilizing process as there is always apt to be some danger of contamination in the process of filling and sealing the jars or cans.

STEPS IN CANNING FRUITS AND VEGETABLES

Selection. Fresh, sound fruits and vegetables insure a good quality canned product and one that is more apt to keep. And since uniformity in the size and ripeness of fruits and vegetables helps to insure a more even distribution of heat through the jars, as well as a more attractive pack, it is a good idea to grade for size and ripeness. If fruit is imperfectly shaped, it is better to slice it before canning. Vegetables, such as Beets and Carrots, which are canned whole, should be assorted by size.

With Peas and Lima Beans it is better to can while young, as the more mature Peas and Beans give a starchy product that is less palatable. Asparagus should be graded according to the thickness of the stalks.

Cleaning. After grading, fruits and vegetables, particularly, should be washed thoroughly to remove all traces of soil. The most dangerous bacteria and the ones most difficult to kill in sterilization are to be found in the soil. In washing, always lift the product out of the water, rather than pouring the water off from the product.

Pre-cooking. Fruits and Tomatoes may be pre-cooked or not, as desired. Apricots, Tomatoes, Peaches and some Plums are scalded to remove the skins. Other fruits are pared with a sharp knife. Vegetables are either pared or scraped. Beets are pre-cooked until the skins will slip; then chilled in the water in which they were cooked before slipping the skins.

Non-acid vegetables should always be pre-cooked to shrink them, to make packing easier, to make possible packing the products into the jars or tins at boiling temperature and to remove excess air. This is particularly important in the vegetables of high cellulose content, such as Corn, where heat penetration proceeds more slowly. Tests have shown that it takes as long as an hour and a quarter for the innermost contents of a jar of Corn to reach boiling. Therefore, if the inner contents are thoroughly cooked and sterilized, the outer portions are apt to be over-cooked. What more frequently happens is that the inner portions are not thoroughly sterilized and spoilage is inevitable when the jars are put into storage.

For detailed directions for the preparation of each fruit and vegetable, see the Time Table on pages 352 and 353.

Sirups Used in Fruit Canning. Sirups are graded as follows: thin, medium, and thick. A thin sirup is made by boiling 1 part of sugar by measure, with two parts of water. (Example, 1 cupful of sugar and 2 cupfuls of water.) For a medium sirup, boil 1 part of sugar with 1 part of water, or 3 parts of sugar to 2 parts of water. (Example, 1 cupful of sugar and 1 cupful of water; or, 3 cupfuls of sugar and 2 cupfuls of water.) A thick or heavy sirup is made by boiling, 2, 3, or 4 measures of sugar with 1 of water.

In each case the sugar and water are heated together and stirred carefully until the sugar is dissolved and the sirup brought just to a boil. Pure extracted fruit juice may be used in place of water in making any of the sirups with marked improvement in flavor.

Preparation and Filling of Glass Jars or Tin Cans. Glass jars should be washed thoroughly in hot, soapy water, scalded, then boiled in water to cover for two minutes. Do not remove them from this boiling bath until just before filling. In lifting them out for filling, be careful to touch only the outside of the jars. In canning open-kettle method, be sure to boil the jar lids and rubbers for at least 5 minutes before filling. Where a long processing time is used, or when the pressure cooker or canner is used, containers need only to be washed thoroughly and rinsed in boiling water. Before using tin

cans, it is only necessary to wash them thoroughly and let them stand in boiling water or in the oven until ready to fill.

In filling the jars, first adjust the rubbers, which have been dipped in boiling water. Then fill the jars to within one inch of the top with fruit and vegetables; that is, with solid fruit. Do not pack the jars or tins too closely, but just allow them to fall into place loosely. Work quickly so that if the product has been pre-cooked it will not cool.

After packing the jars or tins, fill them with the boiling hot sirup, if fruit. If vegetables, add 1 teaspoonful of salt to each quart jar, or a $\frac{1}{4}$ teaspoonful to each pint jar, and then fill with boiling water. Have the level of the sirup or water come to within one-half inch of the top. It is a good idea to slip the sterilized blade of a silver knife around the inside of each filled jar to let out air bubbles.

Sealing. If glass jars have been filled with boiling hot fruits or vegetables they may be sealed completely before they are put into the hot water bath, "waterless cooker," or steam pressure cooker. When processing in the steam pressure cooker, the jars of boiling hot vegetables should always be completely sealed. Cold packed jars should be only partially sealed (see directions below) to allow for the escape of air; otherwise, the pressure as the cold air expands is apt to break the jars.

On the other hand, if the products are to be processed in the oven, it is advisable to partially seal the jars, even when the contents are added hot. To make a partial seal with the screw type of lid, screw the jar lid as far as it will go; then, marking the point with the thumb, turn the lid to loosen just one-quarter inch, no more. To partially seal the wire clamp glass top jars, adjust the cover and raise the upper clamp in position to hold the lid in place, leaving the lower clamp as it is to be lowered only when processing is finished. With all other types of jars, follow the manufacturer's directions for sealing and partially sealing.

Where tin cans are used, it is always advisable to pack the contents hot. Then the cans can be sealed immediately and put to processing. If the contents are put in cold, it is advisable to let the cans stand in boiling water at a bubbling boil for 30 minutes, to drive out the air before sealing; then seal the lids into place and proceed as with hot packed foods. The top and bottom of tin cans are so constructed as to allow for some expansion after sealing. This will handle any bulge during cooking.

PROCESSING—THE VARIOUS TYPES OF APPROVED UTENSILS TO USE

(1) The Hot Water Bath Canner. This may be a cooker or the wash-boiler type, fitted with a rack, preferably wire, which holds the jars at least one inch off the bottom of the boiler, and deep enough to allow for one inch of water over the top of the jars. The jars should not touch each other for best results; it is important that the water circulate freely under and about the jars. The water should be at a bubbling (but not jumping) boil when jars are lowered into it. Glass jars should be hot either from preheating in water or from filling with hot material in order to avoid breaking the glass. The processing time is counted, not from the time the jars are lowered into the boiling water, but, from the time when the water again begins to boil with a bubbling boil. The water should be kept at this degree of boil throughout the cooking and sterilizing process. (For length of time, see detailed instructions in Time Table on pages 352 and 353.) When the processing time is completed, remove jars from the water and completely seal them, if they were not sealed before processing. It is a good idea to invert for a few minutes to make certain that the seal is perfect. Then turn the jars upright and place them apart so that they will cool more quickly. Avoid placing jars in a direct cold draught as this is apt to cause breakage.

Also, it is unwise to attempt turning a screw type of lid tighter after the jar is cool; this is apt to break the seal. Tin cans are plunged at once into cold water after removing from the hot water bath. The tin cans usually show a slight bulge at the lid end. This is natural and the lid will snap back into place as the tin cools. If it does not do this by itself, a slight pressure with the hand will slip it back into place.

Fruits and Tomatoes are canned by the hot water bath canner method. The Bureau of Home Economics at Washington does not advise the canning of non-acid vegetables by any method but the steam pressure cooker. There is increasing evidence that the danger from botulinus poisoning (a very deadly poison) in canning non-acid vegetables is a real menace. Soil vegetables, especially, may be carriers of this deadly germ. To eliminate this danger the pressure cooker with its high temperature is best. Other types of equipment do not give sufficiently high temperature to sterilize.

(2) The Steamer. This resembles a portable oven that is set on a large shallow pan. In the oven-like contrivance are racks,

usually two tiers of them, upon which the jars are set and spaced so that the steam can circulate freely about them. It is important that the water be kept boiling continuously to maintain the 212 degree temperature in the steam chambers above. The water should be added to the underneath pan as necessary. (For length of time for water bath canning, follow the Time Table on pages 352 and 353) allowing 10 minutes additional for each shelf of jars in the steamer, or 20 minutes if there are two shelves of jars

(3) "Waterless Cooker." This may be used either as a water bath canner, immersing the jars or tin cans, or as a steamer. In both cases the jars are set about an inch off the bottom of the cooker.

In using as a steamer, the jars are set in about one inch of water, and the length of time of processing is the same as for the steamer—10 minutes added to the hot water bath canning period.

(4) Oven. This method of processing is advisable only when there is a temperature-regulated oven, *i. e.*, an oven equipped with a temperature regulator which can be set to maintain a steady temperature of 275 degrees. Place the jars from one to two inches apart on the open oven racks, not in pans, as the air must circulate under and about the jars freely. (For length of time of cooking, see detailed instructions in Time Table on pages 352 and 353.) Just as soon as the processing is completed, remove the jars and completely seal. Cool as quickly as possible without submitting to actual cold air draughts.

Tin cans may be processed in the oven if extreme care is taken to see that the contents are at a boiling temperature when sealed and that the temperature is kept constant at 275 degrees; otherwise there is danger from cans blowing up in the oven. After processing, tin cans are plunged at once into cold water or held under the cold water faucet.

The oven method is recommended for fruits and Tomatoes; it is not recommended for non-acid vegetables.

(5). Steam Pressure Cooker or Canner. This method of processing and food being canned is foolproof, or very nearly so. It is the only method recommended for the canning of non-acid vegetables, because it makes possible through holding steam under pressure temperature many times higher than boiling. It also shortens the time of canning. (For length of time of cooking, see detailed instructions in Time Table on pages 352 and 353.)

In using the pressure cooker or canner, follow these directions: Adjust the perforated platform or wire rack in the bottom of the

cooker and pour boiling water up to the level of the platform or rack. Arrange the completely sealed jars in the bottom of the cooker, and adjust the cover, making sure that the cover is down into place as far as it will go. Some cookers have arrows that should coincide when the lid is in the proper position for sealing. Then secure the cover. The most common type of cooker has bolts and wing-nuts; these should be fastened by screwing down opposite ones at the same time, in order to secure a steam-tight joint. A less common type has a large arm band which is secured in place around the rim edges of cooker and lid with a large screw and bolt. The cooker is now ready to be set over the heat, with the petcock on the lid of the cooker opened wide. (Every pressure cooker user should acquaint herself fully with the technique of operation which the manufacturers of all cookers supply). The petcock is left open wide until a steady stream of steam flows from it. This is most important as all the air should be removed from the cooker before the petcock is closed. When the petcock is closed, the temperature will begin to rise as shown on the pressure gauge. As soon as the desired temperature is reached (see Time Table on pages 352 and 353 for instructions on pounds of pressure and temperature), reduce the heat enough to keep a uniform pressure and begin counting the processing time at this moment. Fluctuations in pressure are to be avoided because they are apt to put an undue strain on glass jars or tin cans. In the case of glass jars, breakage may occur if the fluctuation is great, or if the pressure goes so high that steam is blown out through the safety valve.

When the canned products have been processed the desired length of time in the pressure cooker, shut off the heat, move the cooker to a cooler spot on the range, and allow the pressure gauge needle to go back to zero. Then open the petcock, but not before, to let out any steam that may remain and to equalize the air pressure within and outside the cooker. Unscrew the cover and remove the jars. Test glass jars to make sure that the seal is perfect, then set away to cool. Tin cans are taken from the cooker and plunged at once into cold water, or placed under the cold water faucet.

Oftentimes, in spite of careful handling, a little liquid will be expelled from glass jars in the pressure cooker. This does not in any way affect the complete sterilization of the contents, and in no case should these jars be opened and boiling water added.

It is interesting to know that the 10 quart size pressure cooker will hold 5 pint or 3 quart jars; that the 12 quart size will hold 7 pint

or 4 quart jars; the 17 quart size, about 8 pint or 5 quart jars; and the 25 quart size, about 13 pint or 7 quart jars.

TYPES OF GLASS JARS

Jars should be selected with reference to suitable size and shape for the product to be packed. They are to be had in both round and square shapes, and in two colors—green glass and white or colorless. The color does not indicate strength of glass and is merely a matter of choice. If canned goods are to be used for exhibit purposes at fairs, the food products show off to better advantage in colorless glass jars.

The wide-mouth glass top jar with a wire-clamp fastening is a satisfactory and easy type to use and especially to handle while it is hot. The same thing may be said of the hermetical-sealing jar, the lid of which is fastened in place either with a clamp over the top or a rim which screws into place, to be later removed when the cooking is finished and the seal completed. The lid of this type jar has, around the inside edge, a gasket or ring of sealing composition which fills the space between lid and jar. This sealing composition softens when heated and adheres to the jar. The sealing of this jar is similar in principle to the wire-clamp type. Heating forces out the air and makes a partial vacuum in the jar; then the wire clamp or rim, which is placed on the lid, furnishes sufficient pressure to prevent cold air from rushing into the jar as it cools. The pressure of the outside air nearly 16 pounds to the square inch, keeps the jar sealed.

TO TEST GLASS JARS FOR LEAKS

To test glass jars for leaks, adjust a new rubber on each, fill with boiling water, adjust the covers and completely seal them (This test does not apply to the hermetically sealed jars which do not need to be tested beforehand for leaks). Then invert and examine to see if there are any leaks anywhere. After continued use, the upper wire clamps on glass top jars will often need to be tightened. To do this, slip the wire that goes over the lid of the jar out of the wire loops. Grasp the wire with the thumbs placed at the center of the wire, and bend the center down slightly so that it will hold the glass lid more tightly. If in doing this the ends of the wire are separated too far apart so that they do not fit into the neck of the jar, bend them toward each other so that they can be sprung into place in the loops.

It should be remembered that rubber rings deteriorate with age and it is always advisable to purchase new ones each year. A good rubber will not crack when it is bent or folded or stretched or pulled. It will remain elastic and firm and will give a perfect seal that will last.

TIN CANS AND TIN CANNING OUTFITS

There are several home tin canning outfits that are easy and efficient to use. These are small handpower machines and are designed to seal at least two sizes of cans, the large being No. 3, and the small No. 2 cans. The homemaker who does canning on a large scale will especially appreciate the efficiency of the tin canning outfit. The top of the tin can is entirely open and is sealed by a double seaming of the cover onto its edge. The lid of the can is fitted with a sealing substance that makes a very tight seal when the lid is crimped into place on the can. The cans are of two kinds, plain and enamel-lined. The enamel-lined cans are recommended for canning Cherries, Tomatoes, and the berry fruits because they preserve the color of these products better.

CANNING ACCESSORIES

The following pieces of small equipment greatly facilitate the business of home canning: An assortment of sharp, stainless steel knives; a wide-mouth funnel for filling food into jars; a quart and pint measure, and measuring cups and spoons; a jar lifter.

STORING HOME CANNED FRUITS AND VEGETABLES

It is a good idea to label each jar with the name and date before storing away in a clean, well-aired, dark, dry and cool place. A storage temperature that is good is anywhere from 50 to 60 degrees. Look over the jars occasionally to see that they are keeping all right.

YIELDS

In getting the jars and other equipment ready for canning, it is helpful to know that:

1. One crate of Strawberries yields approximately 25 pints.
2. One bushel of Peaches, canned in halves, yields 25 quarts if not packed too solidly; the yield of Bartlett Pears is 30 quarts.
3. One crate of Pineapple canned in diced form yields 32 pints or 16 quarts.
4. One bushel of Plums yields 28 quarts.
5. One bushel of red Raspberries yields 24 quarts.
6. One bushel of Cherries yields 20 quarts.

7. One bushel of greens yields from 10 to 13 pints, depending upon the succulence of the greens. Spinach will yield less than Mustard greens.
8. One bushel of Tomatoes will yield 18 quarts if canned whole; or 25 pints if canned as broken pieces or purée with very little water added.
9. One-half bushel of Kentucky Wonder Beans will yield from 10 to 12 quarts.
10. Twelve to fifteen baby Beets make 1 pint.
11. Four small ears of Corn yield 1 pint.
12. Two quarts of Peas in the shell make 1 pint.

Special Canned Food Delicacies

FRUIT JUICES

GRAPE JUICE

Wash and stem Concord or Moore's early Grapes, selecting fresh and ripe Grapes right off the vines, if possible. Measure out a rounding cupful of Grapes into a sterilized, hot quart jar. Add one cupful of sugar, and fill the jar with boiling water and seal immediately. Invert the jar for several hours, then turn right-side up and store away. Grape juice canned in this way is ready for use in six weeks and is most delicious. Incidentally, the whole Grapes are a delectable addition to a fruit salad or fruit cocktail.

STRAWBERRY-APPLE JUICE

Use everbearing Strawberries, such as the Mastodon variety, and combine with the juice of the tart, early Summer Apples; or can the Strawberry juice in June, then open in Apple season and make the combination juice. Use one part of Strawberry juice (made by covering the berries with sufficient cold water to allow them to float, and then allowing them to simmer until they are soft and have lost color, straining the juice off through a jelly bag) to three parts of Apple juice, prepared as for making Apple jelly. Bring the combined juices to a boil; add one-sixth as much sugar as juice. Bring again to a boil; skim and seal immediately into sterilized, hot jars. This makes a delicious Summer drink iced.

BLACKBERRY JUICE

Coarse and seedy Blackberries not good for canning whole or for preserves make deliciously flavored juice. This may either be used for Winter jelly making or for an iced Summer drink, either by itself or in combination with other fruit juices. (An equally delicious Raspberry juice may be made following this same recipe).

Add water to not quite cover the Blackberries, after crushing the fruit slightly with a potato masher. Simmer gently for 20 minutes; then strain through a jelly bag. Do not squeeze. If juice is to be used for a beverage, bring the strained juice to a boil and add one cupful of sugar to every two quarts of juice; skim and seal in hot sterilized jars. If for jelly, omit the sugar and simply heat to boiling and seal.

TOMATO JUICE COCKTAIL

Crush fully ripe Tomatoes with peeling in a large, enamel-ware kettle. Add water to keep the Tomatoes from sticking and cook until soft. Let cool and run through a fine sieve to remove skins, seeds and coarse portions. To a quart of strained Tomato juice, add one teaspoonful of salt, and two teaspoonfuls of lemon juice and a scant one-eighth teaspoonful of paprika. Fill hot into hot sterilized glass jars, seal, and process in the oven at 275 degrees for 10 minutes.

CANNED FRUITS

PEARS IN MINT SIRUP

Prepare the mint sirup by boiling together one quart of water and one quart of chopped and bruised Spearmint leaves for ten minutes. Strain through cheesecloth, and using the mint-flavored water (which should be made up to again measure one quart) add two cupfuls of sugar and cook up until the sugar is all dissolved.

Peel the Pears (ripe, firm Bartletts are best), pack into hot sterilized jars to within one inch of the top and pour the boiling sirup over them. Seal the jars and process in the hot water bath or "waterless cooker," allowing 25 minutes for quart jars and 20 minutes for pints. If processed in the oven, allow 35 minutes for both pint and quart sizes, at a 275 degree temperature.

BAKED PEARS

Peel Bartlett Pears, leaving the stems intact. Lay the fruit in a flat, enamel-ware baking dish, and cover with a sirup made of $1\frac{1}{2}$ cups of sugar, $1\frac{1}{2}$ cups white Corn sirup, and three cups water. Bake covered for 30 minutes in a moderate oven (375 degrees). Pack into hot jars, cover with the hot sirup, seal and process for 10 minutes in the oven at 275 degrees to insure thorough sterilization. If the Pears are very large, they may be halved and cored before baking.

FRUIT SALAD

Pears, Peaches and Pineapple are a favorite salad combination. The Peaches and Pears are peeled, pitted or cored and quartered; purchase a No. 10 can of broken slices of Pineapple to use with the Peaches and Pears. Meanwhile the Peaches and Pears are dropped into a sirup made of equal parts of sugar and water, and allowed to heat through thoroughly. Pack the fruit at once into hot sterilized jars, alternating rows of Peaches, Pears and Pineapple.

Add one cupful of Pineapple juice to the quart of fruit sirup; heat all to boiling and pour over the fruit in the jars; seal, and process as follows: In the hot water bath, or "waterless cooker," 30 minutes for both quart and pint jars; in the oven at 275 degrees, 40 minutes.

DELICIOUS STRAWBERRIES

Select large, perfect berries, wash carefully, and stem. Measure two quarts of berries into a preserving kettle; add two cups sugar, and a half cup of water. Bring these to a boil and simmer gently for 10 minutes; then remove from the heat, and allow to stand for several hours or overnight. This period of standing allows the berries to reabsorb the juice which they have lost in cooking. When the berries have plumped nicely, reheat to boiling and pack at once into hot, sterilized jars, and seal.

Delicious Jellies, Jams, Preserves, Conserves

JELLIES

APPLE MINT JELLY

Measure out one cup of chopped, fresh Spearmint leaves and put into a sauce pan and add one-half a cup of boiling water. Cover and allow to steep covered for one hour.

Meantime, prepare two quarts of Apple juice. In making Apple juice, do not pare or core Apples unless diseased spots show up. The greatest source of pectin, which is the jelling substance, is to be found just underneath the Apple skin and close around the core. Remember, too, that a clearer jelly is obtained with any fruit juice when the

juice is strained through flannel. Add to this the liquid essence from the mint leaves which has been squeezed through a cheesecloth.

To make the jelly, add sugar in the proportion of three-quarters of a cup of sugar to the cup of fruit juice, preferably not cooking more than three cups of juice at a time. Cook until the sheeting-off test shows up (when two drops run together and sheet off the side of the spoon); then skim and add sufficient green vegetable coloring to make a distinct green color and pour at once into hot, clean jelly glasses.

ELDERBERRY JELLY

Select Elderberries that are not over-ripe, wash, and cook on the stem after first crushing, adding sufficient boiling water to not quite cover. Cook for only five minutes; then strain, and filter the juice through flannel to clarify. To one cup of Elderberry juice, add a quarter of a cup of Crabapple juice and two and one-half cups of sugar. Boil hard for one minute, stirring constantly. Then add two-thirds cup of liquid pectin. Let boil for one minute more; then remove from the heat, skim, and pour at once into hot glasses.

BLACKBERRY AND BLUEBERRY JELLY

Select slightly underripe fruit of each, wash, and cook in separate containers, mashing slightly to start the juice and adding just enough water to not quite cover. Cook for five minutes; then strain and filter juice through flannel.

To make jelly, combine the fruit juices in the proportion of three-quarters of a cup of Blueberry juice to one-quarter of a cup of Blackberry juice and add three-quarters of a cup of sugar. Boil rapidly until the jelly stage is reached when two drops will fall simultaneously from the side of the spoon, running together and sheeting off. Remove from the heat, skim and pour at once into jelly glasses.

CURRANT JELLY

Measure out four quarts of ripe red Currants, wash but do not stem, and place in a large, enamel-ware kettle. Add one cup of boiling water and mash with a potato masher and cook only until tender, not more than 10 minutes. Strain the juice and filter through flannel.

To make the jelly, add sugar in the proportion of three-quarters of a cup of sugar to one cup Currant juice. Cook at a rapid boil until the jelly stage is reached when two drops will fall together and sheet off the side of the spoon. Remove from the heat, skim, and pour at once into hot jelly glasses.

GREEN GOOSEBERRY JELLY

Measure out four quarts of slightly underripe Gooseberries, wash, but do not stem or remove blossom ends. Put into a large preserving kettle with one cup of boiling water and mash to start the juice. Cook for 10 minutes; then strain and filter the juice through flannel.

To make the jelly, heat the juice to boiling, and add sugar in the proportion of one cup of sugar to one cup of juice. Cook at a rapid boil until the jelly stage is reached when two drops will fall together and sheet from the side of the spoon. Remove from the heat, skim, and pour at once into hot jelly glasses.

SPICED GRAPE JELLY

To three cupfuls of thick, unsweetened Grape juice, add three tablespoons of vinegar, and one drop each (no more!) of oil of cloves and cinnamon. Bring to the boiling point and add three-quarters of a cup of liquid pectin; let come to a boil again and boil for one minute. Then remove from the heat, skim, and pour at once into hot jelly glasses.

RED PLUM JELLY

Wash and cut red Gage or similar Plum into pieces, retaining the seeds. Adds

sufficient boiling water to cover, and cook for 15 minutes; then strain, and filter the juice through flannel to clarify.

To make jelly, bring the juice to a boil, and add sugar in the proportion of one cup of sugar to one cup of Plum juice, and cook until the jelly stage is reached when two drops fall together and sheet from the side of the spoon. Remove from the heat, skim, and pour at once into hot jelly glasses.

RASPBERRY JELLY (either Red or Black)

Wash the fruit carefully and place in a large, preserving kettle, adding one cup of boiling water to the quart of Raspberries. Mash the fruit and cook for four minutes; then strain and filter the juice through flannel.

To make the jelly, bring the juice to boiling and add sugar in the proportion of two-thirds of a cup of sugar to one cup of Raspberry juice. Cook at a rapid boil until the jelly stage is reached when two drops will fall together and sheet from the side of the spoon. Remove from heat, skim, and pour at once into hot jelly glasses.

JAMS, PRESERVES, AND CONSERVES

APRICOT JAM

Measure out four pounds of ripe Apricots, cut in halves and remove seeds, but do not peel. Crack about one-sixth of the quantity of seeds, remove the kernels, and add to the fruit. Place in a large preserving kettle, add four pounds of sugar, and bring to a boil over a slow heat. Boil at a simmer for 20 minutes; then remove from the heat, and turn into hot sterilized jam jars or pint or half-pint jars, and seal.

BLACKBERRY JAM

Measure out six cups of Blackberries, wash, and place in a large preserving kettle. Add three-quarters of a cup of boiling water, and cook until the berries are soft (about three minutes). Rub through a sieve, and put back to cook, together with five cups of sugar, the juice of one lemon, and the grated rind of one orange. Cook together until a thick jam consistency.

GROUND CHERRY PRESERVES

Crush and simmer to tenderness enough Ground Cherries to yield one cup of extracted juice when strained through cheesecloth. Place this juice in a large preserving kettle, add one quart of hulled ground Cherries and seven and one-half cups of sugar, the juice of one lemon and another lemon sliced very thin. Mix carefully so as not to break the fruit and bring to the boiling point very, very slowly, so as to dissolve the sugar thoroughly. When dissolved, bring to a full rolling boil quickly and boil hard for one minute. Then remove from the heat and add one cup of pectin. Stir for five minutes, off the heat, skim, and pour into hot containers and seal.

PEACH PRESERVES

Make a sirup of three cups of sugar and one-half cup of water. Bring to a full boil and boil for two minutes. Then add three cups of peeled and chopped Peaches, bring to a boil and boil rapidly until the Peaches are transparent. Remove from the heat, skim, and turn at once into hot sterilized jars, and seal.

STRAWBERRY, OR RED RASPBERRY JAM

Measure out four cups of berries, wash, and stem or cap, and place in a preserving kettle. Add five cupfuls of sugar and place over very slow heat, allowing the sugar to dissolve with as little mixing as possible. When the juice comes up around the berries, stir carefully, and bring to a quick boil and boil rapidly for 10 minutes. Remove from the heat, skim, and set aside until the berries have plumped in the rich juice. This will take several hours or over-night. Then reheat just to boiling and turn at once into hot sterilized glasses or jars.

BLACK RASPBERRY CONSERVE

Mash black Raspberries in an enamel-ware kettle and cook until soft, about five minutes. Do not add any water and stir constantly to avoid scorching. Press the pulp through a sieve to remove the seeds. To the pulp add one-half as much Currant juice as pulp and add sugar in the proportion of one and one-half cups of sugar to one cup of the combined Raspberry pulp and Currant juice. Bring to a simmering boil and cook, stirring occasionally until the jam stage is reached, when a heavy drop will hang from the side of the spoon. Skim, and add broken walnut meats in the proportion of one-half a cupful of meats to two cupfuls of conserve, and turn into sterilized half-pint jars and seal.

GRAPE AND PEAR CONSERVE

Measure out equal quantities by weight of Grapes and Pears. Wash and cook the stemmed Grapes in a small amount of water for 10 minutes; then put through a sieve to remove skins and seeds. Peel, core and slice the Pears and add them to the Grape pulp. Let simmer until the Pears are tender. Then add sugar in the proportion of three quarters of a pound of sugar to the pound of fruit. Boil slowly until the mixture is the consistency of a thick marmalade. Remove from the heat and turn into hot sterilized pint or half-pint jars and seal.

PINEAPPLE PRESERVES

Peel and remove cores from fresh Pineapples and cut into small wedge-shape pieces. Boil for three minutes in just enough water to cover; then remove from the heat and drain, reserving the juice. Using the juice, make a sirup by bringing to a boil three parts of sugar and two parts of juice (by measure). Add the Pineapple and bring to a fast boil, boiling and stirring until the juice is thick and golden, then turn at once into hot sterilized pint or half-pint jars and seal.

GENERAL DIRECTIONS FOR PICKLING

The old-fashioned method of first preparing vegetables for pickling by a long fermentation process (at least six weeks) in the brine, brought about certain changes that made for crispness, transparency, and safe-keeping. While this method is still used by commercial picklers, we have learned that for practical home purposes, very satisfactory pickles can be made by soaking the vegetables, especially Cucumbers, in salt or ice water for a short time (24 hours). This short brine or cold process extracts the surplus juices so that they may better absorb the spiced vinegar and sirup, and makes the vegetable tissues solid and crisp. Occasionally, merely scalding in hot salt water is all that is necessary to accomplish the firming and crisping process.

Sweet Pickles. These are made from either vegetables or fruits or a mixture. Strong vinegar shrinks the more tender fruit cells; hence it is advisable to use a sweet pickling mixture with them, reserving the tougher, less succulent vegetables for sour pickle combina-

tions. The small, compact, and slightly under-ripe fruits make the finest sweet pickles.

Sour Pickles. These are usually made from vegetables. Their ultimate consistency will be found to depend upon the brining or thorough chilling in ice water that they are put through.

Mixed Pickles. These may be either sweet or sour, and made from either vegetables or a combination of fruits and vegetables. They are cut into coarse pieces, never chopped finely.

Relishes. These are made from vegetables usually, coarsely chopped; some of the harder fruits, like Pears and Apples, are frequently used in combination.

Chili Sauce. This is a relish usually made on a foundation of ripe Tomatoes; Chow-Chow is made from green Tomatoes and usually includes a greater variety of ingredients; Piccalilli is a highly seasoned pickle of chopped vegetables, usually including green Tomatoes as well.

Catsups. These are usually made from Tomatoes, but other fruits and vegetables may be used as well. The product is usually strained and cooked down to make a medium-thick smooth paste.

Chutney. This is a hot, spiced sweet pickle, and made of chopped fruits or vegetables or both, and cooked to a thickish preserve-consistency.

PICKLE RECIPES

SWEET CUCUMBER PICKLES

Select and assort about 50 pickles of a 3 in. length, wash, and dry thoroughly. Chill and crisp in ice water for 24 hours; again wipe dry, and pack into clean sterile glass jars of quart or half-gallon capacity.

Into a large enamel-ware kettle, put the following ingredients: One tablespoon of saccharine powder (purchased at druggists), one teaspoon of powdered alum, one-half a cup of salt, three tablespoons of white mustard seed, one tablespoon of ground cinnamon, two teaspoons of whole cloves, one teaspoon of allspice, one cup of ground horseradish, and one gallon of cider vinegar. Heat to boiling, then cool and pour over the Cucumbers in the jars. Seal and store away in a dark, cool, and dry place.

DILL PICKLES

Assort approximately 50 Cucumbers, 3 to 4 in. in length, wash, and let stand in ice water to cover for 24 hours. Then remove, wipe dry, and pack in glass jars or in earthenware three-gallon jar, arranging bunches of dill through the Cucumbers.

In a large, enamel-ware kettle, put two cups of light brown sugar, one gallon of cider vinegar, one-half cup of salt, one teaspoon of alum. Heat to boiling, cool thoroughly, then pour over the Cucumbers; seal if put into jars. If put into a three-gallon jar, place a plate and a small weight on top, and tie a paper securely over the top. These will keep nicely in a cool, dry place.

"BREAD AND BUTTER" PICKLES

Wash approximately two dozen 4- to 5-in. Cucumbers, slice in thick $\frac{1}{2}$ in. slices and cover with ice water and let stand in the refrigerator over night. Or merely wrap in a muslin cloth thoroughly dampened and let stand in the refrigerator for that time. The next morning place in a mixture of equal parts of vinegar and water, bring to a boil, and simmer for 10 minutes. Drain off and discard the liquid.

Into an enamel-ware kettle, put two quarts of vinegar, two cups of sugar, one tablespoon of ground mustard, and one tablespoon of ginger, and bring to a boil. Meanwhile have eight Onions sliced fairly thin and soaking in ice water. Allow them to soak for at least an hour; then drain and add with the drained Cucumber slices to the pickling solution. Just scald the vegetables in this, do not boil; then pack into hot sterilized glass jars and seal.

BEET PICKLES

Wash small baby Beets and cut off stems, leaving about 2 in. next to the Beets. Cook until tender; then let stand until cool. Remove the skins and stems, measure the Beets, and for each 5 quarts of the cooked Beets, use the following pickling mixture: Three cups of cider vinegar, four cups of sugar, two cups of water. Bring to a boil, add the Beets, just bring to a boil again, and pack at once into glass jars, covering with the pickling solution.

WATERMELON PICKLES

Soak seven pounds of Watermelon rinds in ice water to cover, with one cup of vinegar. Let stand over night; then pour off the water. Cook until tender in water to cover, adding another cup of vinegar. Then drain the rinds and drop into the following pickling sirup: Mix together and bring to a boil three pounds of sugar, one pint of vinegar, and one teaspoon of whole cloves. Cook the rinds in this for 10 minutes when they should be clear and transparent. Pack at once into hot sterilized jars and seal.

Canning Questions Answered

1. What is flat sour? How caused? Answer: Flat sour is the term applied to the sourish odor and taste of some canned goods. It is caused by improper handling before canning, by allowing temperatures to range within wide limits—up and down—during processing, or by slow cooling.

2. What is Botulinus? Botulinus is an anaerobic type of bacteria which sometimes allies itself with vegetables through the soil contact. When eaten, it causes a deadly form of poisoning which is frequently fatal. To guard against its occurrence, all non-acid vegetables should be processed in the pressure cooker; they should not be eaten until heated to boiling and boiled for 15 minutes.

3. What causes the bulge on jar lids or the tops of tin cans? This may be due either to an excess of air confined in the jar or can; or to fermentation.

4. How can mold be prevented from forming on the top of jelly? The spores or "seed" of molds are usually planted on jelly while it is

open and cooling. To prevent their alighting, cover the jelly with a thin layer of paraffin as soon as it is poured. Then, when the jelly has cooled, add another layer of paraffin to make a total depth of nearly $\frac{1}{4}$ of an inch.

5. What causes canned food products to fade? Storing in too light a place will cause canned foods to fade. Too strong vinegar will cause pickles to fade.

6. What causes Peaches and Pears to turn brown on top; sometimes throughout the jar? If a small amount of air is present in the top of the jar or can, the fruit on top will show brown color. Also, when there is excess of mineral in water, particularly iron, fruits will sometimes show discoloration. It is a good idea to boil very hard water before using for canning, especially in pickle making.

7. What causes shrinkage? Cold-packing of fruits or vegetables will be accompanied by a greater or lesser degree of shrinkage. It is preferable to heat to boiling and pack hot if shrinkage is to be avoided. Also, in pressure cooker canning, a great variation in pressure may force liquid out of jars, thus causing shrinkage.

8. Is it necessary to have vegetables or fruits covered with liquid to have them keep? No. Never under any circumstances open a jar of sterilized process food, especially canned vegetables, to add more liquid.

9. Can screw top lids be used a second time? Can rubbers be used over again? Screw top lids can be used over and over, providing they do not show signs of wear and rusting through. Old lids often need to have the lower rim forced down to meet the rubber squarely. This can be done with the dull side of a heavy knife blade and some pressure. Rubbers should not be used a second time. The loss through food spoilage can far outrun the cost of new rubbers.

10. How can the crystals in Grape Jelly be prevented? Crystals can be prevented by adding a small amount of Apple juice. A suggested proportion is 3 cups of Grape juice and either 1 or a $\frac{1}{2}$ cup of Apple juice.

11. What causes a rubbery taste in some canned foods? A rubbery taste is acquired from the rubber ring. Processing may be done at too high a temperature for too long, causing rubbers to break down and flavor to be absorbed by the food.

12. What causes fermentation? Yeast plants in the air that come in contact with the food before it is canned cause fermentation. This may be prevented by cooking the foods sufficiently to kill the yeast.

TIME TABLE FOR CANNING FRUITS AND VEGETABLES

Product	Preparation	Processing Time in Boiling Water	Processing Time in Pressure Canner	Processing Time in Pre-heated Oven at 275 Degrees
		Pint and Quart Jars	Pint and Quart Jars	Pint and Quart Jars
Apples.....	Pare, core, quarter, and cover with boiling thin sirup; or pack hot in form of Apple sauce	20 minutes		30 minutes
Apricots.....	Halve and pit, pack in jars, and cover with a boiling thin sirup.	20 minutes		40 minutes
Asparagus.....	Tie in uniform bundles, or cut in ½ inch lengths, and pre-cook for 5 minutes.	*	40 minutes at 10 pounds pressure	*
Beans (String)...	Heat to boiling with water to cover and pack hot into containers.	*	40 minutes at 10 pounds pressure	*
Beans (Lima)....	Use only tender young Beans. Bring to boil with water to cover and pack hot into containers.	*	60 minutes at 10 pounds pressure	*
Berries, Grapes, and Currants..	Pack into containers, cover with boiling medium sirup; or pre-cook and pack hot.	20 minutes		35 minutes
Cherries.....	Pack into containers, cover with boiling sirup, using thick sirup for Sour Cherries, and medium for sweet; or remove pits, add sugar as desired, bring to boil, and boil for 2 minutes. Pack into containers.	20 minutes		30 minutes
Corn.....	Cut off without pre-cooking. Add half as much boiling water as Corn by weight. Heat to boiling and pack piping hot into containers.	*	80 minutes at 15 pounds pressure	*

Product	Preparation	Processing Time in Boiling Water	Processing Time in Pressure Canner	Processing Time in Pre-heated Oven at 275 Degrees
		Pint and Quart Jars	Pint and Quart Jars	Pint and Quart Jars
Figs.....	Let stand for 5 minutes in soda bath (¼ cupful of soda to 1 quart of water). Drain and rinse well. Pre-cook in boiling medium sirup.	20 minutes		30 minutes
Greens.....	Steam until completely wilted and pack hot into containers. Do not pack too solidly. Add liquid to cover.	*	90 minutes at 10 pounds pressure	*
Peaches.....	Pare and halve; pack into containers and cover with boiling medium sirup.			40 minutes
Pears.....	Pare and cook for 4 to 8 minutes in boiling sirup and pack hot; or bake as for serving, cover with medium sirup and can without further cooking.	20 minutes		40 minutes
Peas (Green)....	Same as for Lima Beans.	*	50 minutes at 10 pounds pressure	*
Pineapples.....	Peel, remove eyes, cut into cubes. Pack into containers and cover with boiling thin sirup; or cook in open kettle for 20 minutes and can without further cooking.	30 minutes		40 minutes
Plums.....	Prick, fill containers, cover with boiling medium sirup; or bring to boil in open kettle, using sugar as desired, and cook until tender. Pack hot.	15 minutes		45 minutes
Rhubarb.....	Cut into ½ inch lengths. Pack and cover with boiling thin sirup.	16 minutes		40 minutes
Strawberries.....	Cook gently for 15 minutes in thin sirup. Let remain in sirup for several hours.	16 minutes		35 minutes
Tomatoes.....	Scald, cold dip, and peel. Pack whole or cut into pieces. Cover with hot Tomato juice or boiling water.	25 minutes		45 minutes

*Method not recommended for non-acid vegetables. Use pressure cooker. Pack all vegetables as nearly boiling hot as possible, using additional boiling water if necessary. Add one teaspoonful of salt to the quart jar of all vegetables.

Score Card for Judging Home Canned Food

1. Appearance of Pack	40
a. Color	10
Intensity	
Evenness	
b. Liquid	10
Clearness	
Proportion of liquid to product	
c. Arrangement in jars	10
Fullness	
Neatness	
d. Preparation	10
Skins, spots, soil, etc., removed	
2. Selection of Products	35
a. Appropriateness of product	15
b. Uniformity and shape	10
c. Quality	10
Ripeness	
Crushed appearance in jar	
3. Container	25
a. Perfect seal	15
b. Neatness and Cleanliness	5
c. Labelled appropriately	5
Total score	100



Chapter XXIII

BUNGALOW, OR SUMMER VACATION GARDENING

By E. L. D. SEYMOUR

Fitting the Land—Vegetable Seeds and Plants—Flowers for Summer Planting and Enjoyment

FOR every family with a year 'round home outside the city limits, or with a country home in which each year they can spend six months or more, there are probably a dozen whose vacations of two or three months are taken at different places each Summer—one year in the mountains, another at the seashore, and so on.

While a large part of the pleasure of such a vacation lies in its independence and the freedom from the chores and responsibilities of a permanent dwelling, a distinct disadvantage is likely to be a crudeness of the immediate surroundings, a lack of the colorful, cheerful setting that flowers, vines and other ornamental plantings can provide. Also, unless the location is favored by being near a friendly farmer's place, or a large hotel or boarding house, there is likely to be a scarcity of fresh vegetables—just at the time when newly picked Peas, Beans, Corn and Tomatoes are supposed to be available to everyone in abundance.

But these inconveniences are by no means inevitable and unavoidable even for the bungalow vacationist. Given sufficient desire for one's own garden, no matter how simple, and willingness to do a little planning and work—and, of course, a little ground suitable for cultivation and open to the sun for half the day—one can make flowers and at least a few kinds of vegetables an added pleasure of the vacation season. Indeed, there are several ways to arrange for this desirable result.

One way is to hire someone who lives nearby to get the ground prepared and some of the seeds planted as soon as the season permits. However, unless done by a friend or acquaintance with whose work one is familiar, it is impossible to be sure that this arrangement will work out in line with the ideas and wishes of the occupants of the bungalow. Another plan, sometimes possible, is to visit the place over several

week-ends before the real vacation begins and do the necessary preliminary work at these odd times. This involves a not too distant location and means of transportation, a bungalow that is not occupied by others previous to the opening of the Summer season, and an owner or landlord willing to have the tenant make these advance preparations.

The simplest—and probably most common—course, however, is to put all the effort into a real Summer garden of whatever extent the site permits—one in which the work is not started until well into June and from which results are wanted as soon as possible and only until, say, the middle of September. Naturally, the methods needed to obtain these temporary rewards are likely to differ from those employed in more leisurely, year 'round gardening. They favor the purchase of already started plants rather than the sowing of seeds in many cases; and also, since most bungalow sites are clearings in the midst of woods or rocky, scrubby land, the spaces available for gardening are likely to be small, preventing the use of the larger labor-saving implements and requiring hand labor with hand tools. The objective really boils down to the most results with the least investment of materials that may not be needed a second year.

FITTING THE LAND

If there is no opportunity to have the land manured and plowed or spaded the previous Fall, it will usually be best to skim off and remove the sod and pull up the weeds, etc. wherever the gardening is to be done. This material may be piled away somewhere to rot so that the next year's occupant, if inclined to garden, can make use of the resulting compost. (Incidentally, this pile will be a good place to dispose of the garbage and other decayable refuse, provided the accumulations are frequently covered with a sprinkling of soil or superphosphate fertilizer which will increase the value of the compost.)

Next spade the ground up, working in some well rotted manure if obtainable; usually it will be necessary to rely on commercial fertilizer to reinforce the fertility of the soil. A 100 lb. bag of a balanced, ready mixed brand, fairly rich in nitrogen, will be ample for the season and will justify its cost in more abundant crops. About half should be spread on the ground and worked in before planting; the rest may be applied as the various crops make their growth. Wood ashes from the bungalow fireplace can be used in the same way to improve the soil fertility. Sometimes, in lieu of anything better, the rich, black leaf-

mold from nearby woods can be worked into the garden beds; it may be sour, though, requiring a dressing of agricultural lime to give best results.

VEGETABLE SEEDS AND PLANTS

Some crops can be grown to maturity from seed in two months or less, but it will generally pay the bungalow gardener to buy plants. These will include, among the vegetables, early Cabbage, Tomatoes, Lettuce, and, if the location is warm and sunny, a few Peppers and Eggplants. Some of these may be in full bearing when the vacation ends, but enough should be obtained in the meantime to pay for the trouble. Of the vegetables that it will not pay to grow at all there may be mentioned Celery, Parsnips, Oysterplant, Potatoes, Winter Squash and Pumpkins, Cauliflower, Melons, Leeks, late Turnips and late Cabbage.

As to vegetables that may be grown from seed, the following may be started as late as June 30, though the earlier that month the better. In some cases, as noted, successive sowings can be made every ten days or so. When buying seed, specify the earliest, quickest maturing sorts offered; you are looking for speedy results rather than size and highest quality.

BEANS. (a) Bush stringless green pod or snap. (b) Wax or yellow. Can make two or even three plantings of each of these at fortnightly intervals. (c) Bush Limas.

BEETS. Succession plantings can be made up to July 10. The latest crops can be harvested as greens even if the roots do not mature.

CARROTS. Can plant until about July 5.

CORN. An early variety planted about July 1 may be ready by September 1.

CUCUMBERS. In a warm spot may ripen some fruits by August 15.

ONIONS. Started from sets, successive plantings may be harvested as green or bunch onions (scallions).

PEAS. If season and location are cool, a planting of an early, wrinkled variety may be tried. However, they take up a lot of room for the returns they give.

RADISHES. Started early they may do well; but for Summer growing plant the white, so-called Midsummer kinds.

SPINACH. Another cool season crop, so it is better to use only the New Zealand sort which thrives in hot weather.

SQUASH, SUMMER. Crookneck or Patty-pan type. A hill or two in a sunny spot may ripen some fruits, especially if helped with occasional doses of manure water.

SWISS CHARD. A reliable grower, and even if the stalks do not make full size, the crop will be well worth harvesting as greens.

In harvesting all short-season crops, pick them as soon as they are big enough to eat. This will both stimulate continued production in the case of Beans, Squash, Tomatoes, etc. and also insure products of the finest, tenderest quality.

FLOWERS FOR SUMMER PLANTING AND ENJOYMENT

If you can afford to buy some Aster, Pansy, Petunia, Geranium, Salvia and other Summer blooming bedding plants, you can be sure of a generous supply of blossoms for both outdoor and indoor enjoyment. Even if you have to start seeds there are several kinds from which, under favorable conditions, you should be able to get good returns. Of course they are all annuals. Some of the more reliable are:

BALSAM. White, pink, red.	MARIGOLD. Yellow and orange.
CALLIOPSIS. Yellow and orange.	MORNING GLORY. Various colors. Splendid climber.
CANDYTUFT. White.	NASTURTIUM. Yellow, orange, red. Both dwarf and climbing.
CATCHFLY. White, through pink to purple.	PHLOX. White, pink, red.
COBAREA. White and purple. An attractive climber.	PORTULACA. White, yellow, pink, red. Good for sandy soils.
CORNFLOWER. Blue.	ZINNIA. Various pastel shades.
GYPHOPHILA. White and rose.	

In making sowings in late June and July, especially in light soil, cover the seed somewhat deeper than in making earlier plantings so that the roots will be in the cooler, moister soil. Nitrate of soda or any quick acting nitrogen fertilizer dissolved in water and applied every week or so will hasten the development of vegetables and flowers alike. To keep flowers blooming pick the blossoms as soon as they appear, unless, of course, the planting has been made solely for its mass effect outdoors. As a rule water is not likely to be available for garden use in vacation locations. More dependence must therefore be placed upon frequent cultivation to keep the soil loose and to conserve all the moisture possible. Cultivate shallow and often.



Chapter XVII

MANURES AND FERTILIZERS

By E. L. D. SEYMOUR

The Importance of Plant Feeding—How and Where Plants Get Their Food—Plant Food in the Soil—Organic Sources of Plant Food—Manures—Commercial Fertilizers—Lime Not a Fertilizer—Using Manures and Fertilizers

ONE of the most important problems in gardening is that of keeping plants supplied with the right kind of food material. This can be done with manures and fertilizers and every gardener should know not only when and how to apply these materials to the garden, but also something about their composition and just how the plants make use of them.

In the old days, when practically every place that had a garden included also one or more horses, cows or other farm animals, and when it was usually possible to choose a good location for the garden, the problem was comparatively simple. Barnyard manure used generously and regularly served well to keep up the soil fertility. Today, however, many a would-be gardener must make the best of a definite and limited area in which the soil may be worn out or otherwise deficient; and for most of us—unless we live on or near a farm—good manure is unavailable, or prohibitively expensive. Fortunately science has been discovering important facts about plants and their needs, so that, with the knowledge and the materials it has given us, we can effectively maintain good soils and improve poor ones—if we go about it in the right way. The thing is, to attack the problem in the spirit of adventure, of investigation. No matter how unfavorable conditions may appear, make a start; see what you can grow; try different kinds of fertilizers on a small scale; study the information in this chapter, and for further help in meeting certain conditions, appeal to your seedsman or to your State agricultural college or experiment station.

HOW AND WHERE PLANTS GET THEIR FOOD

Plants have the unique power (not shared by any other living thing) of being able to take substances from their surroundings and

energy from the sunlight and with them build up their own tissues. They do this by absorbing certain chemical elements in the form of various salts and other combinations, which, through the combined action of sunlight and the green coloring matter in leaves, are changed into starches and sugars. These, in turn, are carried by the sap to all parts of the plant to form the twigs, branches, trunk, roots, flowers, seeds and fruits.

The food elements come from three sources: the air, water and the soil. The air provides carbon, oxygen, hydrogen and nitrogen; water, being composed of hydrogen and oxygen, contributes those substances; and from the soil, that is, the mineral part of it, come all the other essential materials which we mention a little farther on. To explain this last statement, we must for a moment recall what the soil is, and how it is formed.

PLANT FOOD IN THE SOIL

Soil consists of fragments of the rock that forms the crust of the earth broken down and ground into minute particles by various agencies, such as weather, rain, glaciers, streams, and many others. But to this mineral debris are constantly being added products of the death and decay of plants and animals. When a leaf falls, or a weed is killed by frost, or when a worm or a field mouse or some larger creature dies, it gradually undergoes decomposition and ultimately disappears, or rather, goes back to nature, into the soil. Thus is supplied what we call the *organic* material in soil, as distinguished from the *inorganic* or mineral part.

Now, in addition to other forces, there are active in the soil not only the organisms we can see, such as moles, worms, insects, etc., but also millions of microscopic bacteria whose task it is to hasten the breakdown of the different crude materials—that is, the plant, animal, and rock fragments—and to help along the chemical changes in which certain combinations of elements are broken down and others are built up. Many of the substances formed are soluble in the film of moisture that surrounds the soil fragments even in what seems to be a dry soil; it is this “soil solution” that provides plants not only with the water they “drink,” but also all the food they get from the soil. For—and this is very important—excepting the carbon, oxygen, and hydrogen that a plant takes directly from the air, *every bit of its food is taken up in solution*, through the tiny root hairs that can be seen near the tip of every new root tip. This explains in part the importance

of an adequate supply of water in the soil; it also shows why what is called an “available” fertilizer—that is, a quickly soluble one—gives prompt results in plant feeding. Of course, a soil can become too wet, in which case, not only are the helpful bacteria prevented from working, but also the plant roots themselves are actually “drowned.”

We have said that nitrogen comes from the air, which is true; but plants (with rare exceptions) are not able to take it in that form. They must absorb it, along with the mineral elements, in the form of nitrates, phosphates, etc. dissolved in the soil solution.

In addition to the four chemical elements mentioned, about 16 others have been found in plants. But it is not known that all of these are essential to their existence; some may have merely been taken in as part of certain combinations. Scientists are convinced, however, that in order to live and grow, a plant *must* secure ten elements; and it is suspected that four more are necessary under certain conditions. These fourteen, which we may say make up the plant diet, are: *Nitrogen, phosphorus, potassium, calcium, carbon, hydrogen, oxygen, iron, magnesium, sulphur, boron, copper, manganese and zinc.*

Fortunately for us gardeners, all but three of these are ordinarily obtained by garden plants without any difficulty or help, either from the air, water, or the soil, as already noted. In other words, most soils contain an adequate supply of all but the *nitrogen, phosphorus* and *potassium*. These, then, are the “big three,” the elements that man must supply, and upon which the importance and usefulness and value of all manures and fertilizers are based.

While any material that will provide food for plants (or, in other words, “fertilize” the soil) can rightly be called a fertilizer, the practice is almost universal to restrict that term to the commercial, usually manufactured, products discussed on page 363. A few of these are “organic” (of plant or animal origin, as explained above), but most of them are inorganic, that is, of mineral or chemical origin.

MANURES, THE REAL ORGANIC FERTILIZERS

By manures we generally mean the various “natural” products of the barnyard, the garden etc., from which plants can derive nourishment. Of true plant and animal origin, these materials are sometimes modified, reinforced or combined by man to increase their efficiency or make them better able to fulfil certain requirements. They may be considered under four general heads, as follows:

Humus—This is a name for all more or less decayed plant and

animal matter. Examples are wood mold, peat or muck from swamps, peat moss, compost (which is a mixture of sods, leaves, garden litter, garbage, etc. piled up and allowed to rot) and the like. Insofar as all those materials contain some of the plant food elements we have spoken of, humus has fertilizer value, but this is variable and the material has to undergo considerable change before it becomes available for plant use. The most important function of humus is to improve the texture of a soil, by making it looser, more spongy, darker colored. A soil thus improved is not only a better medium for vigorous plant growth, but it is also better able to benefit from applications of more available, special fertilizers. Humus helps thin, sandy soils by giving them more body, and heavy, stiff clays by loosening them and making them more open. No source of humus should ever be wasted in the garden.

Animal Manures—Consisting of the excrement or solid and liquid waste from animals plus various kinds of bedding and absorbent material, all stable manures contain plant food elements in fairly well balanced proportions, as well as humus. Except on bare land they should not be used until well rotted; however, if left unprotected outdoors too long, they may lose much of their value through fermentation and leaching. Also they are of variable composition, depending upon the kind of animal, the kind and amount of bedding, etc. And today, except in favored locations, stable manure is so hard to get as to be practically outside the garden picture. Poultry manure, and various dried sheep and horse manure preparations are more often obtainable; they are useful because they are convenient to handle and quite concentrated; for the latter reason it is well to mix them with a little soil and take care to keep them off plant foliage when applying them to growing crops.

Green Manures—Any crop—even weeds—dug or plowed into the soil while young and succulent rapidly rots and contributes to the soil the plant food elements it contains. Crops planted for that purpose (usually grains, or legumes, such as clover) are called "green manure" crops. Legumes are especially valuable because their roots are inhabited by a certain kind of bacterium that is able to take the nitrogen of the atmosphere and store it up in small swellings or nodules on the roots. When the plant dies this supply of nitrogen is added to that in the soil. Thus by growing a legume crop you can leave a soil richer in nitrogen than it was before. A good practice is to sow a mixture of Rye and Vetch (one pint, equal parts, per 100 sq. ft.), or of

Peas and Oats, on any patch of ground that is going to be unoccupied after September 1st. Plow or dig the crop under the last thing in the Fall or as early as possible in the Spring, and add a light dressing of lime to help break it down and you will go a long way toward keeping the soil in good condition.

Miscellaneous—Various by-products from packing houses, such as bonemeal, tankage, fish scrap, dried blood, etc. make up a final group of organic fertilizers. Bone materials are especially rich in phosphoric acid, the others are principally valued for their nitrogen content; but with improved manufacturing methods many of them are now prepared and sold as cattle or poultry foods for higher prices than they could bring as fertilizers. Wood ashes, a valuable source of potash, and various crop by-products, as cottonseed or Castor Bean meal, should also be classed as organic fertilizers.

A new and valuable development in garden practice has been the perfection of a method of making an excellent substitute for stable manure. It is, in effect, an improved, more efficient form of composting that results in a richer, more valuable product than ordinary compost. All that it calls for is a mixture of certain chemicals, which can be made at home according to any of several formulae recommended by different State experiment stations, or purchased in the form of a patented, trade marked material called Adco.

To make the "synthetic" manure, the gardener simply builds a rectangular pile, of convenient proportions, of chopped straw or hay, lawn clippings, fallen leaves and other garden refuse—so long as it is not woody. Every six-inch layer of such material should be leveled off and sprinkled thickly and evenly with the chemical mixture before the next layer is added. When the pile is, say four or five feet tall, the top is leveled so as to leave a slight depression in the center, and the heap is thoroughly wet down. (If the whole thing is done at one time, it is well to wet down each layer after the application of powder is made.) The pile is then left alone (but kept moist by being watered once or twice a week) for two or three months, by which time it should be in good shape to be cut up with a sharp spade and piled up again for further rotting. In two or three more months (if the temperature has stayed above 60 deg. and if the pile has been kept moist) it will closely resemble well rotted stable manure—in appearance, plant food value and effect, but *not* in odor, there being nothing unpleasant about it.

COMMERCIAL FERTILIZERS

Formerly this term meant fertilizers of any sort that were collected in different places and shipped in commerce, such as the deposits of guano or bird manure in South America, and bone collected in desert places and shipped to factories to be ground up. Today, it refers more accurately to processed or manufactured products or by-products, including phosphate rock (treated with acid to supply phosphorous in usable form); kainit, a German ore containing potash; waste materials from the steel industry, and, the most recent development, combinations of atmospheric nitrogen with lime, etc.

All these fertilizers are, in general, concentrated, more or less soluble or available, dry and convenient to use, of known, definite composition and analysis and, naturally, more expensive than the older manures. However, because of their fitness for the purpose and because they represent a minimum of waste, they are economical if rightly used. They include various materials rich in only one or two of the essential food elements; and also mixtures (or, as they are called, "complete" or "balanced" plant foods) in which nitrogen, phosphorus and potassium are provided in available form and in the right proportions to give best results under average conditions. When special crops or soil conditions call for special measures, the gardener can, if he wishes, and if the size of the operations warrant, buy the individual fertilizers and "mix his own."

Nitrogen Carriers—Principal commercial sources of this, the most necessary and expensive plant food element, are nitrate of soda, ammonium sulphate, and calcium nitrate, an atmospheric nitrogen product. Nitrogen promotes growth and helps build leaf and stem tissue so it is especially needed by all leaf crops such as lettuce, cabbage, etc. and wherever rapid, uninterrupted development is essential. Because it is costly, it should be used carefully and applied in concentrated form only when the crops are growing and able to use it.

Phosphorus Carriers—Aside from animal bone, the chief sources of phosphorus are rock phosphate, either raw or treated with acid to make the plant food more available; and basic slag, a steel plant by-product containing calcium and other minerals as well. Phosphorus hastens maturity, stimulates root growth and contributes to seed formation, increasing the proportion of grain to straw in cereals, etc.. Because of its importance, acid phosphate is often sprinkled on manure or even on the floors of barns to reinforce the manure.

Potassium Carriers—Potassium gives strength and vigor to all parts of the plant but especially the young, growing tissues. It makes stems tough and helps a plant resist disease and difficult conditions. The main fertilizer sources are muriate, sulphate, and nitrate of potash, kainit and wood ashes, as already mentioned. This element is frequently lacking in sandy soils and also in peat or muck deposits which otherwise are excellent producers of lettuce, celery, and other leaf crops.

Fertilizer mixtures are sold under trade names or by analyses which must, by law, be printed on the package. An analysis gives the percentage of the three elements in this order: Nitrogen, phosphorus (or phosphoric acid) and potassium (or potash). A "4-12-6" is, therefore, a mixture 100 lbs. of which contains the equivalent of 4 lbs. of nitrogen, 12 lbs. of phosphoric acid and 6 lbs. of potash; the remaining 78 lbs. consist of the other elements that go to make up the chemical compounds in which the plant food elements exist, and perhaps some "filler," the amount depending on the quality and price of the mixture. Roughly, a good all round garden fertilizer should contain not less than 3 per cent of nitrogen, 8 of phosphoric acid and 5 of potash; of course the greater the total percentage (provided the materials are well balanced), the more valuable and effective the fertilizer should be.

LIME NOT A FERTILIZER

Contrary to a quite general impression, lime (which is mostly calcium) is not a fertilizer. Plants fill their calcium needs from other sources. However, lime is valuable as a soil modifier. It tends to correct an acid condition, it improves the texture and drainage in heavy clay soils, and it hastens the decay of organic matter, thus increasing the supply of available plant food. It may be used as raw ground limestone or as prepared agricultural (slaked) lime which is more rapid in its action, at the rate of half a pound or more per sq. yard. It should be sprinkled on freshly dug soil and well raked in. It should *not* be mixed with, or applied at the same time as, manure.

USING MANURES AND FERTILIZERS

On the basis of the foregoing facts, some practical suggestions can be made as follows:

Don't use fresh manure except to spread on bare ground where it will be turned under well in advance of planting time. For best results, compost manure with leaves, peat moss, lawn clippings or soil; or let it rot well in a place sheltered from rain and hot sun. Apply

rotted manure before plowing or digging and work it in well and deep; a bushel per sq. yd. is none too much. If you mulch beds with manure (rotted) after the ground freezes, rake off the coarser part early in Spring and later fork in the rest. Manure spread on the lawn is likely to bring in weed seed and, unless spread very thinly, it may kill out the grass in patches. Manure and other humus is especially valuable on very sandy and very stiff soils.

Apply commercial fertilizers often in small amounts rather than rarely in large quantities. A good plan is to apply 3 to 4 lbs. per 100 sq. ft. at the final fitting of the soil, raking it in thoroughly before seeding or planting; and then apply about half as much twice or three times during the growing season. Keep commercial fertilizer away from seeds, bulbs or plant roots and off plant foliage; it burns. The safest thing is to water the ground well immediately after applying fertilizer. This puts it into solution so the plant roots can take it up. In applying fertilizer to growing crops, sprinkle it along the rows or around the hills and cultivate it in; then water as suggested. Don't try to save money by buying a cheap fertilizer—or by trying to avoid feeding your plants. It costs just as much in time and labor and seed to grow a poor crop as a good one. It pays to provide enough plant food to insure quality, quantity and rapid, uniform growth in whatever you want to raise.



Familiar Fertilizers and Their Uses

(This table and that on page 369 by PROF. T. H. WHITE, *University of Maryland*)

The following list briefly presents the characteristics of the various materials available for garden use. Manures and fertilizers should not be regarded as alternatives or competitors; actually, they supplement one another, working together to produce maximum results. Added to a soil already in good physical condition, a fertilizer will give quick results, hastening and stimulating growth. But on a soil lacking organic matter and the spongy, friable texture that manure helps to create, even a high class, concentrated fertilizer cannot insure complete satisfaction as measured by crop quality, size and earliness.

ASHES, HARDWOOD	Unleached hardwood ashes contain potash and lime and are valuable as a fertilizer wherever those elements are needed. Especially good on Rose beds.
BLOOD, DRIED	Rapidly soluble, therefore quickly beneficial; valuable for all vegetable crops. Essentially a nitrogenous fertilizer.
BLOOD AND BONE	A high-grade, well-balanced fertilizer, of considerable value for all garden purposes.
BONEMEAL	Decomposes rather slowly and is therefore of lasting benefit. A safe and effective source of potash and phosphoric acid.
BONE, CRACKED	For Grapevines, fruit trees and shrubs of all kinds. Apply when planting out and mix well with the soil to a depth of a foot or more.
CATTLE MANURE, SHREDDED	For general fertilizing; good to mix with compost.
COMPLETE FERTILIZERS	Various brands are procurable from most dealers. They combine the essential plant food elements in convenient form, which justifies their increased price over the materials if bought separately.
HORSE MANURE, DRIED	A general all-round soil enricher; promotes rapid, steady growth.
HUMUS	Any kind of rotted vegetable matter is valuable for its beneficial effect on the physical condition of soils, especially sandy ones. (See "Humus as a Fertilizer" on another page). The various brands offered are handy for making rich, light potting soil, compost, etc.
LAND PLASTER	Of value as an absorbent of liquid manures in stable; also as an insecticide for Cucumber, Melon and Squash pests. Has no plant food value.

LIME	Neutralizes the acidity of soils and increases availability of plant food. Apply as far in advance of planting as possible. Some plants are injured by its presence, notably Rhododendrons and their relations.
NITRATE OF SODA	An active, quickly soluble, nitrogenous fertilizer, stimulating the leaf growth. Can be used alone as top dressing or in solution, or mixed with other fertilizers. Use at rate of one ounce per square yard; work well into soil and keep off foliage.
PHOSPHATE	Name sometimes given to any commercial fertilizer, but strictly some form of ground phosphatic rock; acid phosphate is the most soluble form. Promotes seed development and fruit development.
POTASH, MURIATE AND SULPHATE	Two closely similar sources of the essential element, potassium, which is needed for the best development of all crops.
POULTRY MANURES	Properly handled, the richest of farm manures. To prevent loss of nitrogen keep mixed with peat moss, or other absorbent. Crush lumps before using; apply between, not on, plants.
SALT, AGRICULTURAL	Used as a top dressing for Asparagus beds in the Spring. Also a good weed killer.
SHEEP MANURE	A popular natural manure, dried and pulverized for easy handling. Gives good results in the vegetable garden and as lawn dressing. Makes a rich liquid manure.
SOOT, SCOTCH	Stimulates growth, improves color of foliage and flowers and is an effective remedy for slugs, grubs and cutworms.
SULPHATE OF AMMONIA	A soluble, quick acting nitrogen carrier. Resembles nitrate of soda and is used in the same way.

Fertilizing Table

Dealers in cataloguing fertilizers generally advise the application of a given quantity per acre. As this often puzzles persons who have only a small garden to cultivate, the following table will prove useful:

Quantity per acre	Equivalent per 10 sq. ft.	Quantity per acre	Equivalent per 10 sq. ft.	Quantity per acre	Equivalent per 10 sq. ft.
100 lbs.....	$\frac{1}{8}$ oz.	800 lbs.....	3 oz.	1,500 lbs.....	$5\frac{1}{2}$ oz.
200 lbs.....	$\frac{3}{4}$ oz.	900 lbs.....	$3\frac{1}{8}$ oz.	1,600 lbs.....	$5\frac{9}{10}$ oz.
300 lbs.....	$1\frac{1}{10}$ oz.	1,000 lbs.....	$3\frac{3}{8}$ oz.	1,700 lbs.....	$6\frac{1}{4}$ oz.
400 lbs.....	$1\frac{1}{2}$ oz.	1,100 lbs.....	4 oz.	1,800 lbs.....	$6\frac{3}{8}$ oz.
500 lbs.....	$1\frac{4}{5}$ oz.	1,200 lbs.....	$4\frac{1}{5}$ oz.	1,900 lbs.....	7 oz.
600 lbs.....	$2\frac{1}{5}$ oz.	1,300 lbs.....	$4\frac{3}{4}$ oz.	Ton.....	$7\frac{1}{8}$ oz.
700 lbs.....	$2\frac{1}{2}$ oz.	1,400 lbs.....	$5\frac{1}{4}$ oz.		

Suitable Fertilizers for Vegetables and Fruits

The table shows some of the important vegetables and fruits arranged in groups with the suitable fertilizers for any vegetable in the group. *Any one or all three of the different fertilizers can be used.* If all three are used take one-third of each or, if two are used, one-half of each.

NAME OF VEGETABLE	SUITABLE FERTILIZERS	RATE PER SQUARE YARD	WHEN APPLIED
Corn Cabbage Cauliflower Eggplant Tomato Lettuce Peas Squash Celery Melons	Stable manure..... or Poultry Manure..... or Commercial fertilizer containing: nitrogen 5%, phosphoric acid 8% and potash 4%.	10 or 12 pounds 1 pound 2 ounces	Before plowing or digging After plowing Just before planting
Potatoes Turnips Radish Beans Parsnips Onions Carrots Salsify Beets	Stable Manure..... or Poultry Manure..... or Commercial fertilizer, nitrogen 2%, phosphoric acid 8%, potash 4%.	10 or 12 pounds 1 pound 2 ounces	Before plowing for previous crops Just before planting
Grapes Currants Gooseberries Rhubarb Strawberries Asparagus	Stable manure..... or Poultry manure..... or Commercial fertilizer: nitrogen 4%, phosphoric acid 8%, potash 4%.	10 or 12 pounds 1 pound 2 ounces	Between the rows in Winter Just before cultivation commences in the Spring
On vacant land	Green Manure—Broadcast seed at time of last cultivation. Dig or plow crop under while soft and green		

For a complete work on the subject of this chapter we recommend

FERTILIZERS FOR GREENHOUSE AND GARDEN CROPS

By ALEX. LAURIE and J. B. EDMOND

Secure your copy where you bought your Garden Guide

Chapter XXV

Pruning

By ALFRED CARL HOTTES

Its Advantage—Pruning Briers and Roses for Landscape Effect—Climbing and Polyantha Roses—Hybrid Perpetuals—Teas and Hybrid Teas—Shrubs—Hedges—Fruit Trees—Evergreens—List of Subjects with Pruning Instructions

PRUNING, when practiced properly, is an aid to trees and shrubs. 1, It not only stimulates growth, 2, but increases fruitfulness at certain seasons; 3, it keeps the plant full of healthy, disease-resistant growth, and 4, gives us the privilege of changing the habit. We do admire symmetrical, dense trees, graceful shrubs or stocky hedges, all of which are maintained by pruning. Many times we even admire the picturesque results that can be obtained by making a tree grow out of its natural development. Pruning does stimulate growth because it tends to send the energy to the part of the plant in which it is most wanted. It is well known that a pruned plant inclines to resume its natural habit and that there is always a tendency to grow from upper buds. Checking the excess growth of vigorous shoots usually causes an increase in flower production.

WHAT PRUNING INCLUDES

Besides the general removal of large branches, pruning includes the process of: 1, pinching, or removing undeveloped eyes to check growth in a certain direction; 2, trimming, shortening top and roots at transplanting; 3, topping, removing the leader or a flower stalk to retain the energy in the plant rather than in making a strong leader or seeds; 4, suckering, the removing of shoots at base of plant to throw the strength into the plant itself (this would include the cutting of shoots from the stock in grafted plants); 5, disbudding, removing of small buds at sides of main ones to throw the food into the perfect production of the larger flower; 6, ringing, the cutting out of a narrow ring of bark from a branch of a tree (in the case of fruit the result is the production of a large specimen due to the fact that the food is all kept at the place beyond the ring); 7, root-pruning, the cutting of

roots at planting time so that they may be symmetrical and have clean, undecayed surfaces, but the top must always be shortened proportionately when this is done; 8, sprouting, the cutting out of all sterile, unfruitful branches, which are usually called water sprouts.

ROSES

If we observe Rose bushes we will be able to see that they bloom from what were the strong shoots the previous season. There is an annual renewal of wood, therefore, and this is why pruning is necessary. Most Roses must be pruned severely at planting. Some climbers are ruined from the start by too little pruning. Take care not to leave stubs above a bud either; the tips always die back and may die farther back than preferred.

BRIERS AND ROSES FOR LANDSCAPE EFFECT

Those Roses which are to be seen in mass and with which a profusion of bloom is to be preferred to a few slightly larger blooms should be pruned but little. The main work is to improve the shape of the bush and cut out the very oldest wood. Wood which has flowered year after year should be cut out from the base of the plant so that the younger shoots may be given a chance. Prune in March.

CLIMBING AND POLYANTHA ROSES

Little pruning is necessary in Spring except to cut out any branches which have been killed. The old wood can usually be gradually removed year after year. All new canes should be carefully tied up. Prune in March and remove some of the old blooming wood soon after the flowers have faded.

HYBRID PERPETUALS

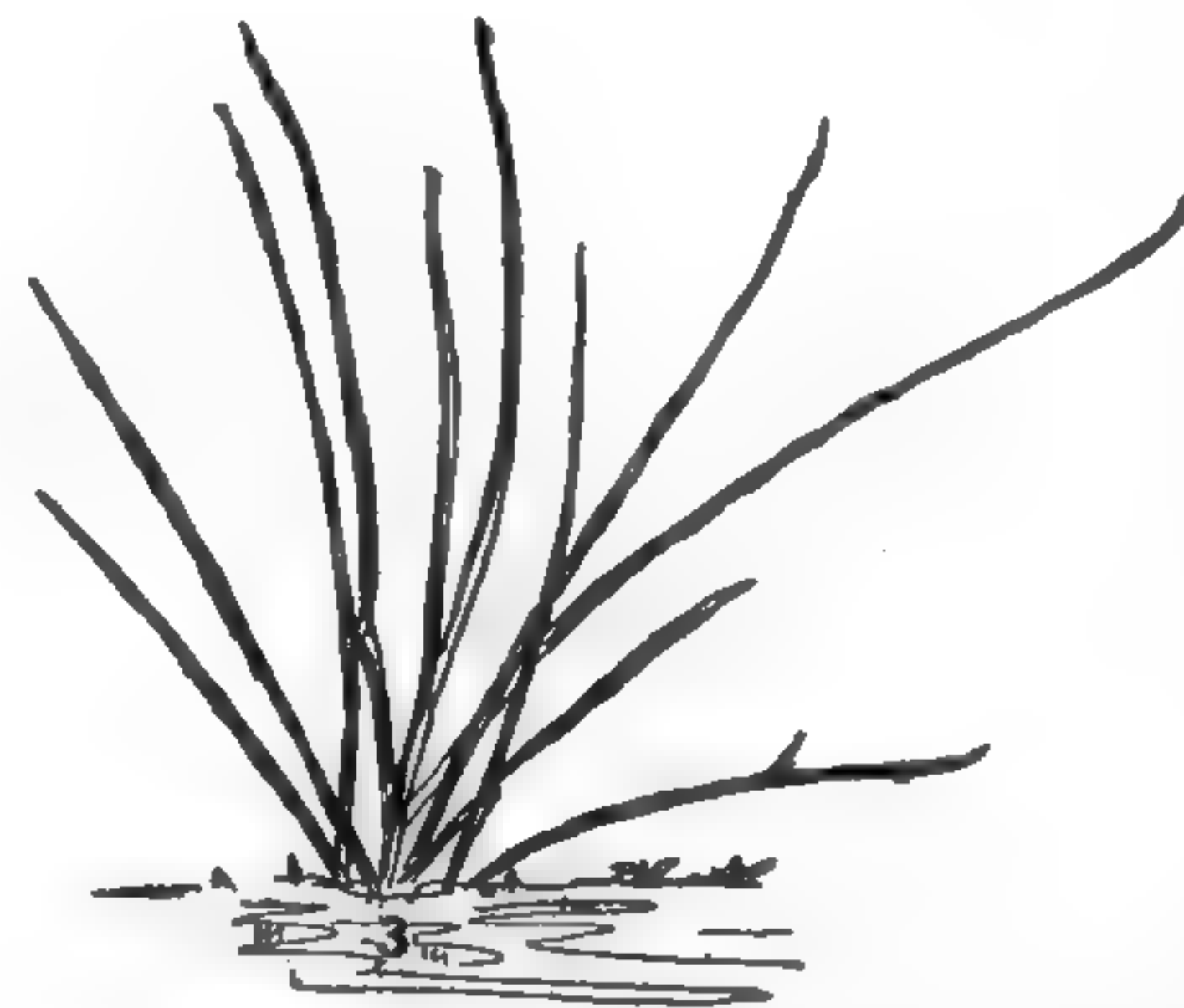
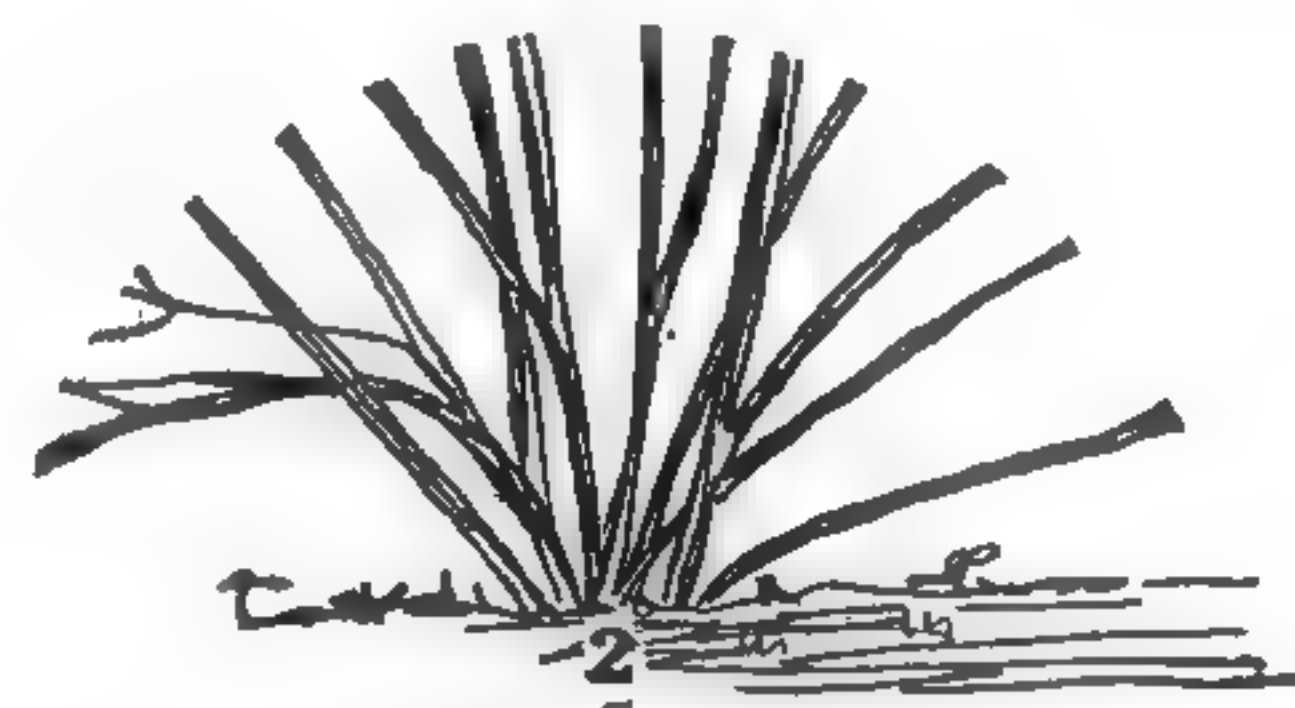
Various soils and climates cause the Hybrid Perpetuals to be either very tall bushes or, in other localities only to attain a height of three feet. The varieties differ greatly in height and amount of pruning needed. The weak-



Pruning a Dwarf Rose

The dotted lines show the growth or stems that are to be cut away. As a rule, amateur gardeners are too much afraid to prune hard. "The weaker the growth the harder the pruning," is a fairly safe rule to follow.

est shoots should be pruned the most severely; in the same way the strongest varieties need the least pruning. Never leave a weak shoot. Care must be exercised that all shoots are not pruned to the same height. Prune early in Spring for main pruning, because the shoots are likely to freeze back if done in Fall or Winter. The canes of the strongest varieties, which may be eight or nine feet long, should be shortened a third in Autumn to prevent the injurious whipping by the Autumn winds.



Pruning Shrubs

1. An unpruned example. 2. Pruned so that all the branches are of equal length. This is improper but all too commonly practiced. 3. Oldest wood which has bloomed has been thinned out and shortened. This is the correct method. It is the same shrub in each case.

THE TEAS AND HYBRID TEAS

The Hybrid Teas and true Teas often freeze back to the soil; if so, remove all wood which is the least bit browned. Take care to prune very severely; the plants will appreciate it and reciprocate by producing bloom of superior quality and long stems. All shoots which live through the Winter should be shortened at least one third. Never make the mistake of thinking that there is so little bush left that it will be best not to prune at all. Nothing could be more faulty. Budded Roses must be carefully watched for suckers from the stock, which should be removed from their point of origin. The leaflets of the budded stock are often paler green and not so glossy, and have five to seven leaflets, instead of three to five, as with many varieties. Never prune before eyes start because some may be frozen back if done too early.

SHRUBS

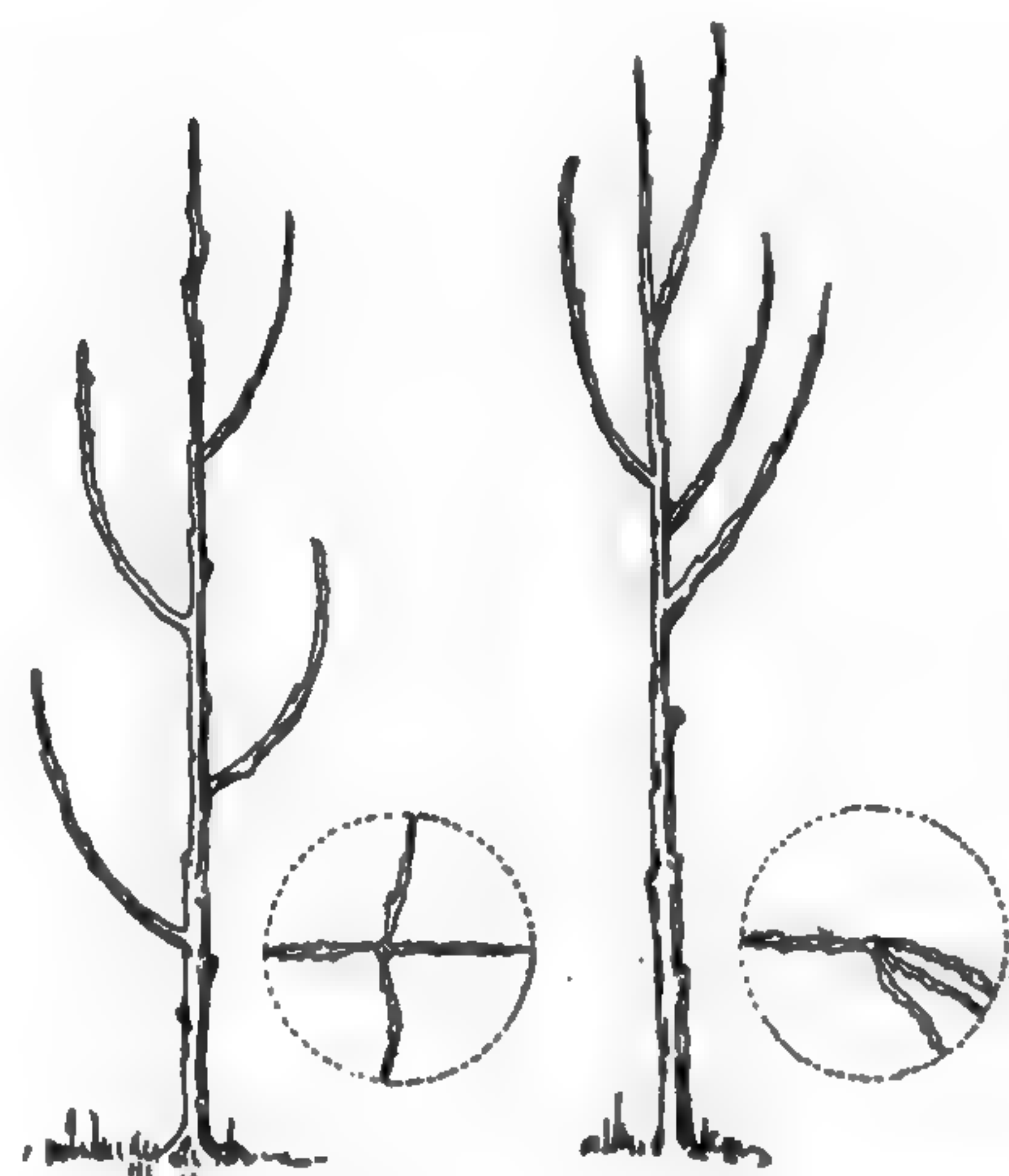
There are essentially two classes of shrubs—the Spring and the Summer blooming ones. Those which bloom in the Spring have their flower buds all formed on the bushes by the previous Autumn; they are usually near the top of the plant. Any pruning in late Winter or early Spring causes a removal of these flowers.

The most pernicious habit is the one which so many enthusiastic gardeners have of pruning everything in the Spring, and not only that, but making the graceful Barberries, Spireas and Mockoranges into formal, stiff shapes, due entirely to cutting their bushes with shoots all the same length.

Many Spireas and Goldenbells never bloom well, while the Hydrangea blooms perfectly, merely because every one prunes in the early Spring, which is not at all the proper time for, say Goldenbells, but exactly proper for Hydrangeas. Spring blooming shrubs must be headed in a trifle after flowering, which will cause the production of flowering wood for another year. (See page 375).

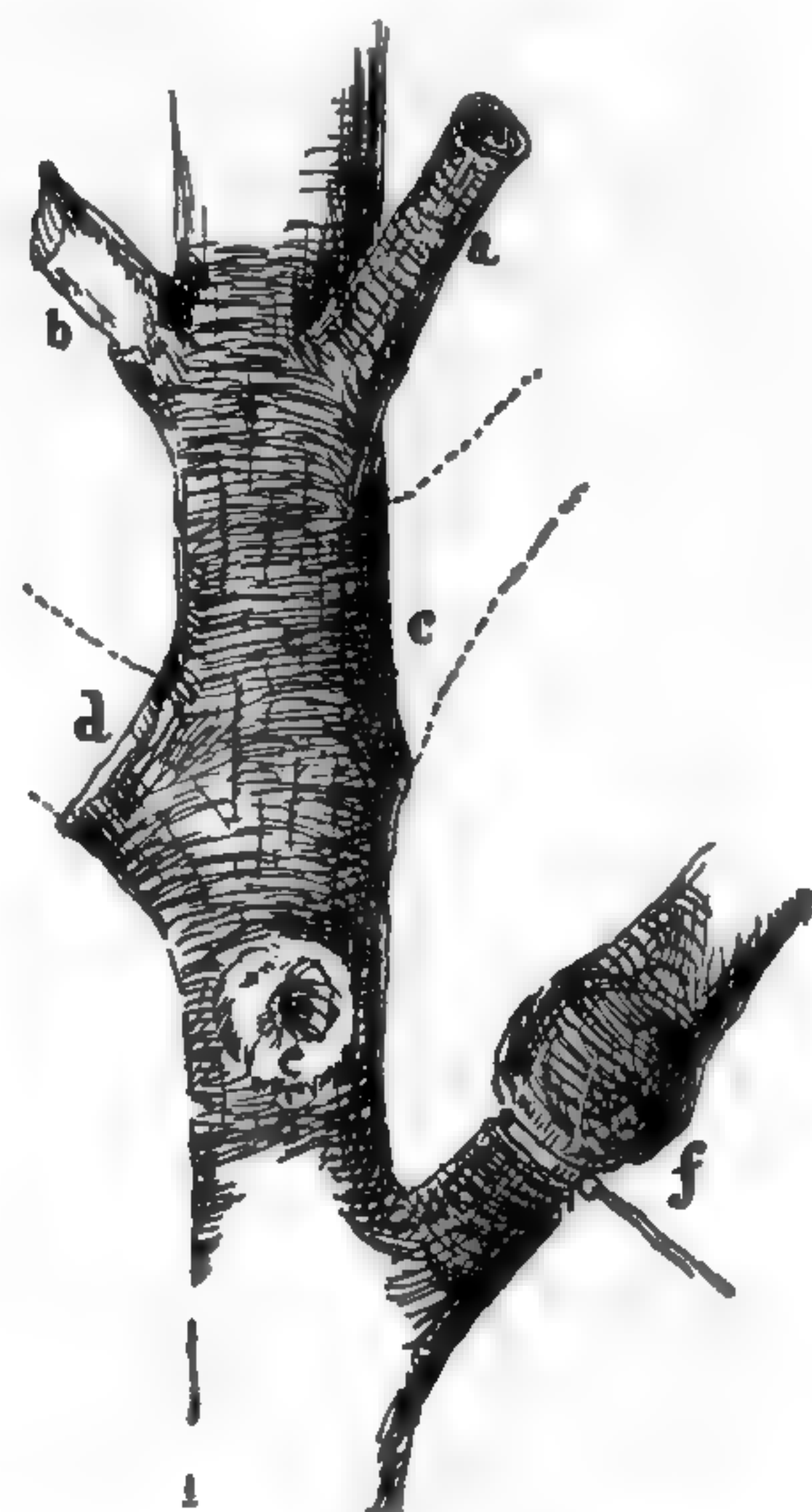
HEDGES

A hedge, in order to give the best light conditions to the lower branches, should be broad at the bottom and narrower at the top. It is best not to be flat on top for snow quickly lodges in this sort of hedge and spreads it so that the true beauty is spoiled. Hedges should be trimmed before growth starts in the Spring and again lightly in late



Young Trees Pruned

One at the left pruned properly, the head started low and branches well distributed. One at right—head too high, branches form a crotch and tree is not balanced



Pruning a Limb

a, Branch cut off too long. b, The branch (a) after several years, has died back but cannot heal. c, A branch cut properly. d, A branch which is improperly cut so that a pocket is left in which water can settle and cause decay. e, A wound healing properly. f, A branch being strangled by a wire-tie

Summer or Fall. The young growth is best kept its proper length before it grows very long, otherwise the cut ends of the branches are large and over conspicuous.

FRUIT TREES

In pruning fruit trees for home grounds there should be an effort to keep them always low headed and open. This means that from the start the branches should be encouraged to grow out from the main trunk. Avoid allowing the branches to start so that a crotch is formed and have them distributed around a tree so that when they bear fruit there will be a natural balance. As the years pass, less pruning is necessary on fruit trees, except to keep the center open so that some light can get in to color the fruit. Dead or crowded branches must be removed. Any appearance of disease is better cut out than any treatment that can be given it. A tree once in good bearing condition seldom needs extensive pruning.

EVERGREENS

Evergreens need little pruning except to correct any lack of uniformity of growth. Many times in Pines, among the young growths some appear to be away ahead of others; if care is exercised they may be slightly pinched to check growth in that direction. Even if the leader of Spruces or Firs is lost, they seem capable of making a new one. If, however, these and other conifers whose leaders having lost their terminal buds fail to develop naturally, a new leader can often be made to replace one lost by taking a top branch, bending it to a vertical position and maintaining it in that position by tying it, not too tightly, to the stub of the old leader. In due course this branch will assume an upright form and the tie can then be cut. Much can be done by staking and training of evergreens, assisted by pruning.

DIRECTIONS FOR PRUNERS

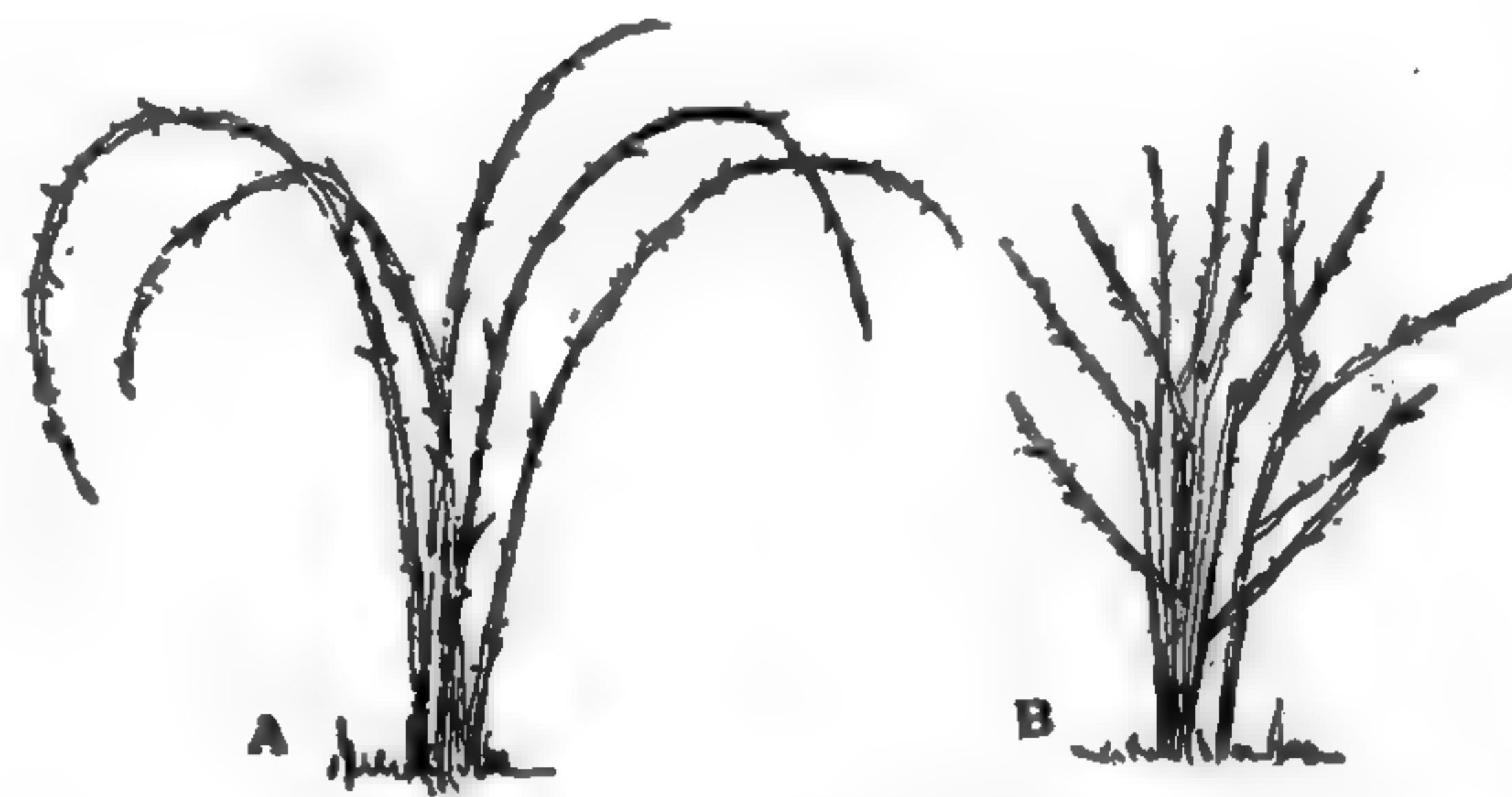
Below is given a list of some seventy-five of those plants in general use, with directions how and when to prune. By following the directions given the amateur gardener will be able to show good and satisfactory results.

Name	How to Prune	When
AKEBIA	Give only a little pruning.	July
AMORPHA (Bastard-indigo)	Rather severely to keep the plants compact.	Jan.-Mar.
APPLE	Requires pruning each year. For home garden Apple tree heads should be low so that the fruit may be readily picked. Keep the tree open in center by removing all branches which interfere, those which cross or shade each other.	Feb.-Mar.
AZALEA, GHENT and MOLLIS	Remove old wood and faded flowers before they develop seeds.	July
BERBERIS THUNBERGI VULGARIS	Remove only oldest shoots to retain form.	July
BLACKBERRIES	Remove old canes after fruiting; tip back in Spring 4 or 4½ ft.	Mar., July
CELASTRUS (Bittersweet) CERCIS CANADENSIS	Require almost no pruning unless dead wood is removed.	July
CHERRY, Sour	Need little pruning except to remove branches which are crossed, broken, or dead.	Feb.-Mar.
CHERRY, Sweet	Keep head low because they have tendency to grow tall, and also to prevent the damage often caused by sun and wind.	Feb.-Mar.
CHIONANTHUS (Fringetree)	Requires very little pruning.	April

Name	How to Prune	When
CLEMATIS	Rather vigorous pruning.	Jan.-Mar.
COLUTEA (Bladder-senna)		Jan.-Mar.
CRATAEGUS (Hawthorn)		July
CURRANTS	Canes bear two or three times, cut out few oldest canes each year, otherwise fruit becomes small.	Feb.-Mar. Late Sum.
DEUTZIAS	Unless over long do not cut back shoots.	July
DOGWOOD	Little pruning is desirable.	July
DWARF BUCKEYE		Jan.-Mar.
ELAEAGNUS	Needs to be looked over each year for removal of old wood and straggling branches.	July
EXOCHORDA (Pearlbush)	Cut back just after flowering.	July
FLOWERING CURRANT (Ribes aureum)	Encourage vigorous young growth. Trim out older wood.	July
FORSYTHIAS (Goldenbells)	Thin out branches and trim back others immediately after flowering.	May
GOOSEBERRIES	Remove oldest shoots annually. In July or Aug. head back each branch slightly; it causes more fruit buds to form.	Late Summer.
GRAPES	Persons who have inherited tangles of Grape vines should exercise care in pruning the first year. Do not remove too much at the start, otherwise no Grapes will be produced. When possible, all immature canes should be pruned back to a single eye if the vines are very large, but two eyes may be left if the vines are quite small. Should one acquire or have to buy new vines, it is well to have a definite simple system of training. Grapes at planting and the year after should have the vines cut back two to three eyes. Then head back to 20 to 24 in. long. Several systems of training are good.	Jan.-Mar.
(See illustrations—pages 321, 322)		
	<i>Munson System.</i> Will be found illustrated and described in full in fruit chapter. Claimed to be the easiest for the amateur.	
	<i>Kniffin System.</i> Good if wind is not too strong; simple. Single trunk is carried to the upper of two wires and two canes are taken out at an eye for each wire. Each year all the canes are removed except a shoot from each; spurs are chosen from the trunk. A vine may carry 40 buds usually; 10 on each arm. The fruit canes are produced on shoots of previous year's growth.	
	<i>Fan or Chautauqua System.</i> Two short, permanent branches are established at the lower wire; two or three canes are left on each arm and tied up to upper wire; these canes are renewed each year from buds at their base. When arms get too old, new ones are easily established.	

Name	How to Prune	When
HIBISCUS (Shrub-althea)	Rather severe pruning is necessary in cold climates where tips freeze.	April
HONEYSUCKLES	The climbers and the bush Honeysuckles, except Springflowering <i>Lonicera fragrantissima</i> which two latter prune in July.	Jan.-Mar.
HYDRANGEA	These shrubs should be large because they are old; they should not be allowed to get into a monstrous size when young; their beauty is entirely spoiled by such treatment. Severe early Spring pruning is advisable except for the French and Florist or House Hydrangeas which bloom from the buds formed during the last year.	Jan.-Mar.
JAPANESE QUINCES KERRIA JAPONICA KOELREUTERIA (Goldenrain-tree)	Require only that old wood shall be removed. This is by nature an irregular small tree but the tips of the twigs often are Winter-injured. Shorten any straggling shoots after flowering.	July Jan.-Mar. July
LABURNUM (Goldenchain-tree)		
LIGUSTRUMS (Privets)	Tolerate severe pruning and shearing to formal shapes.	July
LILAC	Prune out old wood if specimen flowers are preferred, also prune out all the sprouts from the base.	Jan.-Mar.
MAGNOLIAS	Require only that old wood shall be removed. Tar over all scars.	July
MAHONIA (Oregon Hollygrape)	Require only that old wood shall be removed.	July
MATRIMONY-VINE (Lycium)		Jan.-Mar.
MOUNTAIN-LAUREL	Requires only that old wood should be removed.	
PEACH	The Peach bears on shoots of previous year. The tree must, therefore, never be headed back; whole branches should be removed when pruning but head back all twigs which are Winter-injured. Heading in does cause production of new wood but method advised is better.	Feb.-Mar.
PEAR	Low heads, keeping them open if possible. Keep all branches free from water sprouts.	Feb.-Mar.
PHILADELPHUS (Mockorange)		Jan.-Mar.
PLUM	Moderate pruning only to remove old branches and new ones if tree becomes overloaded.	Feb.-Mar.
PRIVET	(See Hedges, page 373. Also page 404).	
PRUNUS (P. tomentosa, P. triloba, and Double- flowering and Dwarf Doubleflowering Alm- ond)	Prune as for Apple.	Feb.

Name	How to Prune	When
QUINCES	Head very low. Cut back ends of branches. Fruit borne on wood of current season.	Feb.-Mar.
RASPBERRIES, Black	Remove all canes immediately after fruit is harvested. Pinch off new growth when it reaches a height of 3 feet.	After fruiting.
RASPBERRIES, Red	Remove old canes after fruiting, leaving young canes. Do not head back as with Blackberries, or Black Raspberries; suckers start too freely. Early Spring clip back ends of shoots so that ends are 30-36 inches long or do not prune if trained on trellis.	July-Mar.



Pruning Raspberry Canes

Remove all the old canes in Winter, as shown at A. Canes of black Raspberries, when growing can be tipped to produce laterals as at B. These will fruit the following year

RHODODENDRONS	Remove oldest wood only; remove seed pods.	July
RHODOTYPOS		July
SNOWBALL (Viburnum opulus sterilis)	This is naturally a badly shaped shrub; prune to improve form.	July
SNOWBERRY		Jan.-Mar.
SPIRAEA VANHOUTTEI	Remove old wood. The branches that have bloomed should be pruned down half way. In North, the tips freeze; they need a little Spring pruning. Main pruning after flowering.	July
SPIRAEA THUNBERGI		July
SPIRAEAS (Summer-blooming)	Thin them out in Winter. Cut back shoots that have flowered.	Jan.-Mar.
STAPHYLEA (Bladdernut)	Require only that old wood shall be removed. Prune hard back.	July
TAMARIX		Jan.-Mar.
VIBURNUM	Includes Hobblebush, Arrowwood, Snowball.	July
WEIGELA	Cut out old wood. Remove seed vessels.	July
WISTERIA		July
WITCH-HAZEL		July

Chapter XXVI

PLANT PROPAGATION

By ALFRED CARL HOTTES

Hardwood Cuttings—Softwood Cuttings—Making Cuttings of Perennials—Leaf Cuttings—Root Cuttings—Division of Perennials—Seed Sowing: Perennials and Annuals—Vegetables—Starting Flowers Indoors—Shrub and Tree Seeds—Grafting—Budding—Layering

WHY don't you propagate more of your plants and share your good ones with your neighbor? Nothing is more interesting than to get a slip from a neighbor. Plants of this sort carry with them memories of your friend which add to the charm of the plant itself. By doing so you will add to the number of garden lovers.

HARDWOOD CUTTINGS

People are afraid to cut up plants, but they wish they had a whole hedge of a certain shrub instead of one plant. If that is true in your case, do this: In the Fall, cut up in six inch lengths the good, strong, whip-like branches of such plants as Privet and Hydrangeas; tie them in bundles and either bury them in a sandy knoll, or place them in a box of sandy soil in the cellar. Absolutely cover them. Water them occasionally. By Springtime the wood will have healed over a bit at the base and cuttings should then be placed in a well prepared soil so that only two buds are above ground. Climbing Roses, Grapes, Currants, Goldenbells, Spireas, Lilacs, Willows, Mock-orange, Dogwoods and Deutzias are quite easily propagated in this manner. Note the illustration; it shows how wood should not be left above the top bud, and how the base of cuttings should be cut clean



A softwood (Chrysanthemum) cutting. Such cutting may be 3 in. long—the best long

just below a bud or buds. If the leaves are on the plant, remove them.

SOFTWOOD CUTTINGS

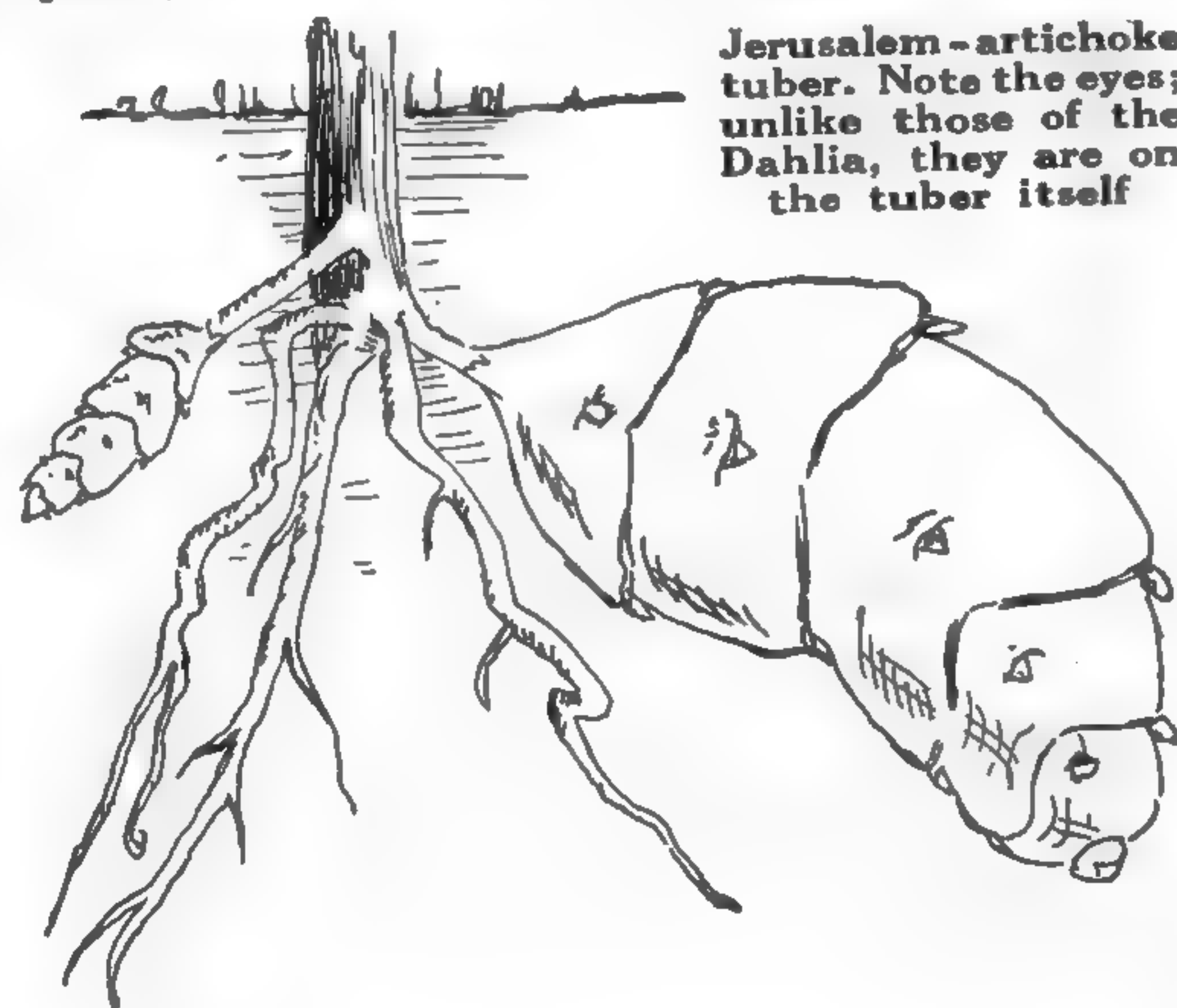
You can easily multiply your shrubs and even Roses during the Summer if you will make slips. Three to six inches is long enough. The slip should have a few leaves at top; the others should be removed. This type of cutting is called a softwood cutting. Cuttings have no roots, no method of taking up food from the soil so that food stored in the stem and leaves which should produce roots is lost by evaporation if too much foliage remains on the cutting; if the leaves are large they are often trimmed smaller. The cuttings, when made, should

be placed in a box of sand or directly in the soil if it is sandy. Put the cuttings in rather deeply and firm them in very solidly. If there is a large glass jar or bell-glass handy, use it to cover those plants which you usually think are a little more difficult to root, such as Roses. But all cuttings, whether



Dahlia root, showing young shoots starting and where to cut apart (c)

covered with glass or not should have a shading. A good place for the cuttings would be under the Grape vines where there is always ample shade. Water them thoroughly. Firm them in sand solidly, give them shade, and water carefully. Cuttings of any sort should not be placed right where they are to grow.



Jerusalem-artichoke tuber. Note the eyes; unlike those of the Dahlia, they are on the tuber itself

MAKING CUTTINGS OF PERENNIALS

This sort of cutting can be made of hundreds of perennials. If you wish to increase your stock, merely take little slips in the Spring when the plants are six or seven inches tall. Be sure to leave a few buds below where the cutting is taken; it will not injure the plants in the least, but will cause them to become branchy. Choose wood that is a little ripened.

Perennials which are readily propagated by cuttings are:

Arabis (Rockcress)	Heuchera (Coralbells)
Asclepias (Butterflyweed)	Hollyhock
Cerastium (Snow-in-summer)	Iberis (Candytuft)
Chrysanthemum	Larkspur
Clematis	Lobelia
Dahlia	Loosestrife
Eupatorium (Includes Mistflower, Thoroughwort, and Joe-pye-weed)	Lotus
Helenium (Helensflower)	Perennial Sunflower
Hesperis (Dames-rocket)	Phlox
	Pink
	Potentilla (Cinquefoil)

LEAF CUTTINGS

Leaf cuttings are rarely made in the garden, but if some friend has given the reader a slip of a Rex Begonia he may attempt to root it. Remove all but one leaf and oftentimes that leaf needs shortening. The leaves removed can be cut up in small pieces so that each piece has a portion of the heavy midrib at the base. When inserted in sand, several inches deep the base will root and a young plant starts.

ROOT CUTTINGS

Root cuttings are interesting to make. Plants with rather thick roots can usually be propagated by this method. A box will be necessary for such propagation; it should be about three inches deep and nearly filled with a light loam. The roots are cut into pieces an inch and a half long, and are scattered over the surface of the soil and covered about one-half inch deep with light soil. The box should then be placed in shade, watered and covered with a paper. In a short time shoots will start and the young plant can be transplanted to another location. The following plants can be propagated by this method:

Polygonum, Euphorbia, *Plumbago larpentae*, Saponaria, *Coronilla varia*, Achillea, Japanese Anemone.

There are a number of perennials propagated by root cuttings which succeed better when the roots are planted perpendicularly with a little piece of the end protruding. They are usually fleshy rooted sorts. Among the plants are: Italian Borage (*Anchusa*), Plume-poppy (*Bocconia cordata*), Dodecatheon, Stokes-aster (*Stokesia laevis*), Beebalm (*Monarda*), perennial Phlox, Gaillardia, Gypsophila, Helianthus, Thermopsis, Papaver, Statice, Bleedingheart, Peony. Lily-of-the-valley is increased by separating the pips or individual crowns. Among the vegetables, Horseradish is so propagated. Scotch and Moss Roses, Calycanthus, Lilacs, Devils-walkingstick and Blackberries may be propagated this way.

DIVISION OF PERENNIALS

Perhaps the commonest method of propagation of perennials and the one which is easiest, is the division of clumps, the main crowns being cut into a number of pieces. The plants should be divided very early in Spring before growth starts, or late in the Fall. This is the most used method of propagating Iris, Peonies and Phlox. Bearded Iris should be so divided every three, Phlox every four, and Peonies every six or seven years, while Michaelmas-daisy, *Achillea ptarmica* and *millefolium roseum*, Helianthus, Sedum, some Veronicas, Chrysanthemums, Oenothera, and all perennials which sucker badly should be moved and divided every year. Artemisia, Boltonia, Campanula, Geum, Hosta, Doronicum, Armeria, } *Thalictrum* are all propagated by division.

SEED SOWING

PERENNIALS AND ANNUALS FROM SEEDS

If we possess coldframes and hotbeds we can sow many of the perennials in March and get them to bloom the same year. We can sow annuals also and have them of excellent size for setting in open ground. We may also sow perennials and annuals out of doors, in which case some will bloom the first year, but with others a longer time will be required.

The following are a few of the perennials which will bloom the first year from seed: Gaillardia, Iceland Poppy, Chinese Larkspur (*Delphinium chinense*), Lychnis, Shasta Daisy, Platycodon.

On the other hand, there are many perennials which wait a year before flowering, namely: Cardinalflower, Golden Alyssum, Campanula, Columbine (*Aquilegia*), Foxglove, Loosestrife, Physostegia, Hollyhock, Dames Rocket.

The main advantage of growing perennials and annuals from seed is that it saves the cost of buying plants, which runs up pretty high when quantities of plants must be bought from nurseries. Many of the best varieties do not come true to seed, however, for seedlings often vary in color and habit. This is true especially of highly bred plants, hybrids which have resulted from the incorporation of several species. Peonies, Phlox, Iris and such perennials should be purchased, not raised from seed.

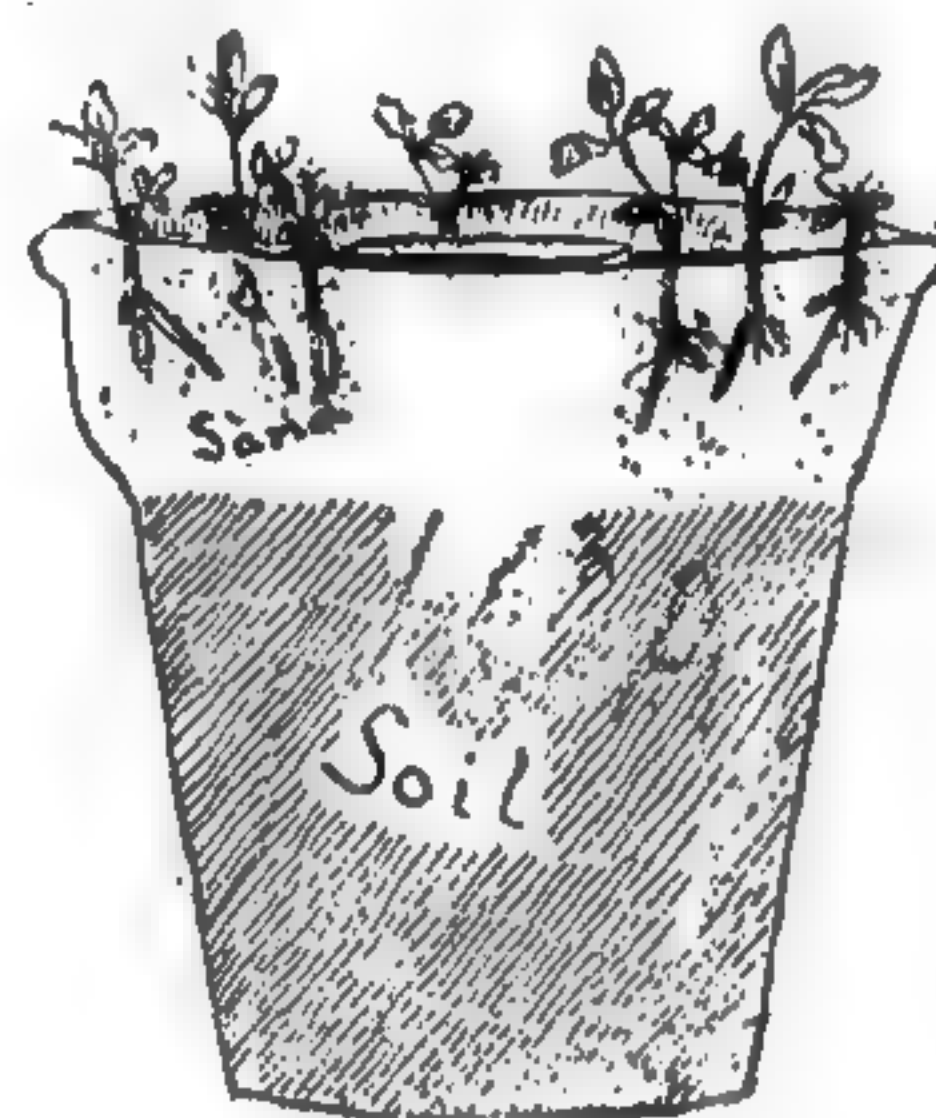
VEGETABLES

The hotbed or coldframe is more essential for the vegetable garden than it is for the flower, since we can get the crops so much earlier. Everything is so tender and as it seems out of season tastes so good that all the pains of regulating the hotbed are worth while. Lettuce can be matured in such structures and Tomatoes, Eggplants, Beets, Onions, Muskmelons, and even Corn can be started. The space is valuable, so that careful planning is necessary to utilize every bit in the hotbed. (For hotbeds, see Chapter XXXIII.) Many persons will not have hotbeds, but will need to depend upon the windows for their early start.

STARTING FLOWERS INDOORS

There is always a danger in advising a very early start for sowing seeds indoors, for the reason that the plants are apt to become very spindling owing to the diminished light most of us can supply plants in our houses. For the early Spring sowing we shall need to save the soil in the cellar. It should not be too rich but should be loose, made so by the addition of sand, coal ashes, or leafmold. It should be in a fine condition. Small, shallow boxes, three inches deep, are best for seed sowing. The bottom should have a number of cracks and should be covered with some coarse drainage material, as broken crockery, sod or stones. The flats should be filled even full, then drills should be made, the depth varying according to the sort of seeds that are to be sown. A depth equal to twice the diameter of the seed is all that is necessary indoors. The reader is referred to the Garden Calendar (in Appendix) for the proper time to sow each vegetable or flower. The seed may be sown thinly, so that each seedling will have plenty of

air and space. When sown the seed should be covered and the soil firmed by the use of a board. After watering carefully with a fine spray, the box should be covered with glass and a newspaper, and put in a suitable place for growth. Just as soon as the seeds have germinated the shading of paper should be removed so that the plantlets may get the full light.



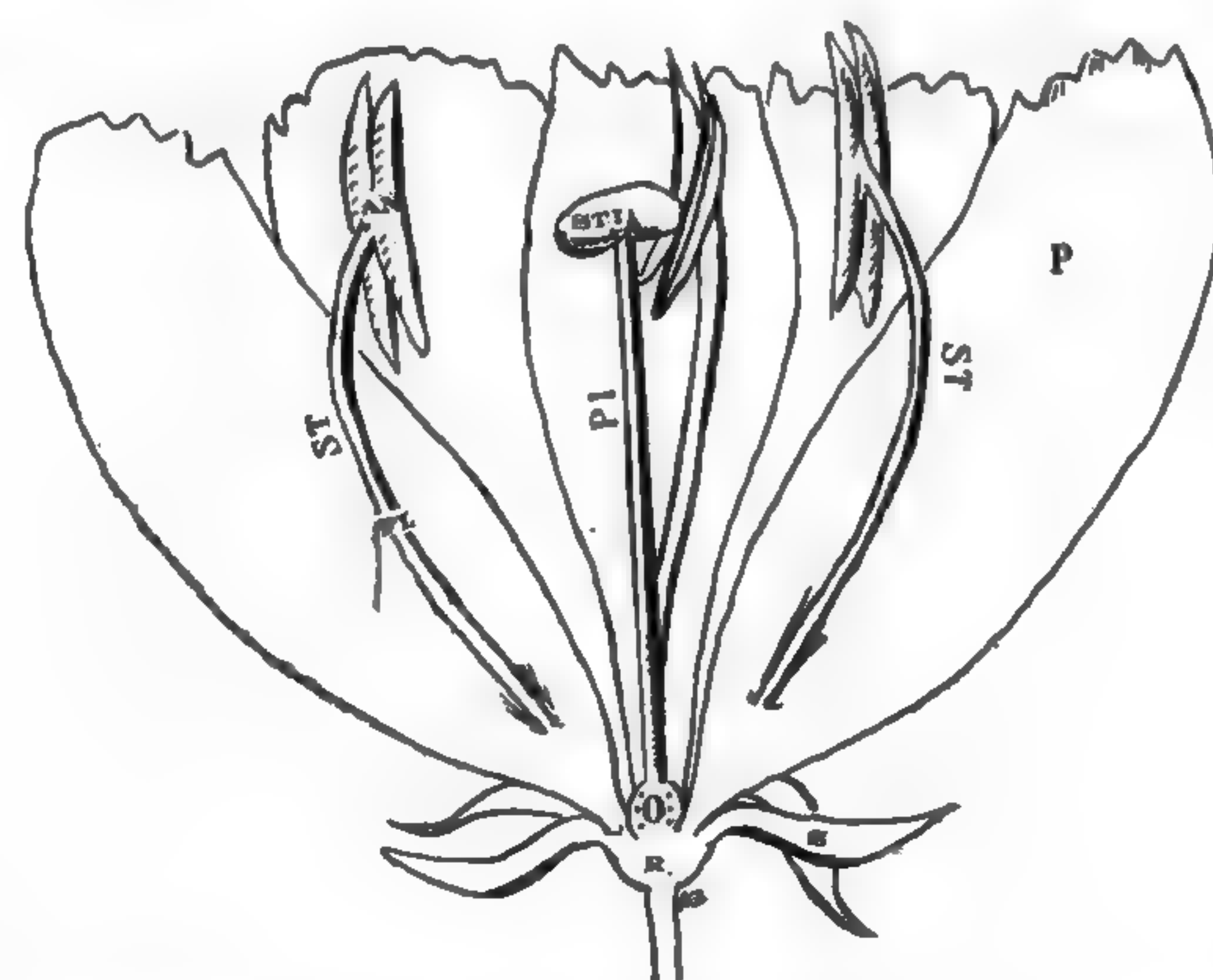
Flower pot filled with soil and sand, the sand at the top

Softwooded cuttings root most readily if placed around the edges of the pot. Seedlings transplanted may be placed similarly

sand is placed; the seeds are sown broadcast and covered by at least an inch of sand. The flats are watered thoroughly and placed in the basement until February, when they are taken out of doors and allowed to freeze. This is necessary to break their heavy coverings. This process is known as stratification; the following shrubs should be so treated: Barberry, Sweetshrub, Jersey-tea, Snowdrop-

SHRUBS AND TREES FROM SEED

When the fruits of many of the trees and shrubs, as Regel Privet, Hawthorns, Rhodotypos, Roses, Barberries, Boston-ivy, Euonymus, and Viburnums, are thoroughly ripe they should be gathered and so placed that the mass of berries will ferment a little. The pulp of the fruit can then be washed from the seeds. Boxes should then be procured in which a layer of



Section of a Typical Flower

p—Petal: The petals taken together are called the corolla. s—Sepal: Sepals taken together are called the calyx. st—Stamen: The male part of plant. fi—The filament or thread-like part of stamen. an—The anther or pollen producing part of stamen. pi—Pistil or female part of flower. sti—The stigma or part receiving the pollen. o—The ovary which bears the seeds. r—Receptacle, often helps to make up the fruit

tree, Shadbush, Privet, Honeysuckle, Styrax, Snowberry, Coralberry, Hawthorn and the Viburnums. When the ground is in condition for planting, sift the seeds from the sand and in rows. Planting should not be delayed or else the seeds will have sprouted and will be injured by the handling at this time. They should then start rather readily.

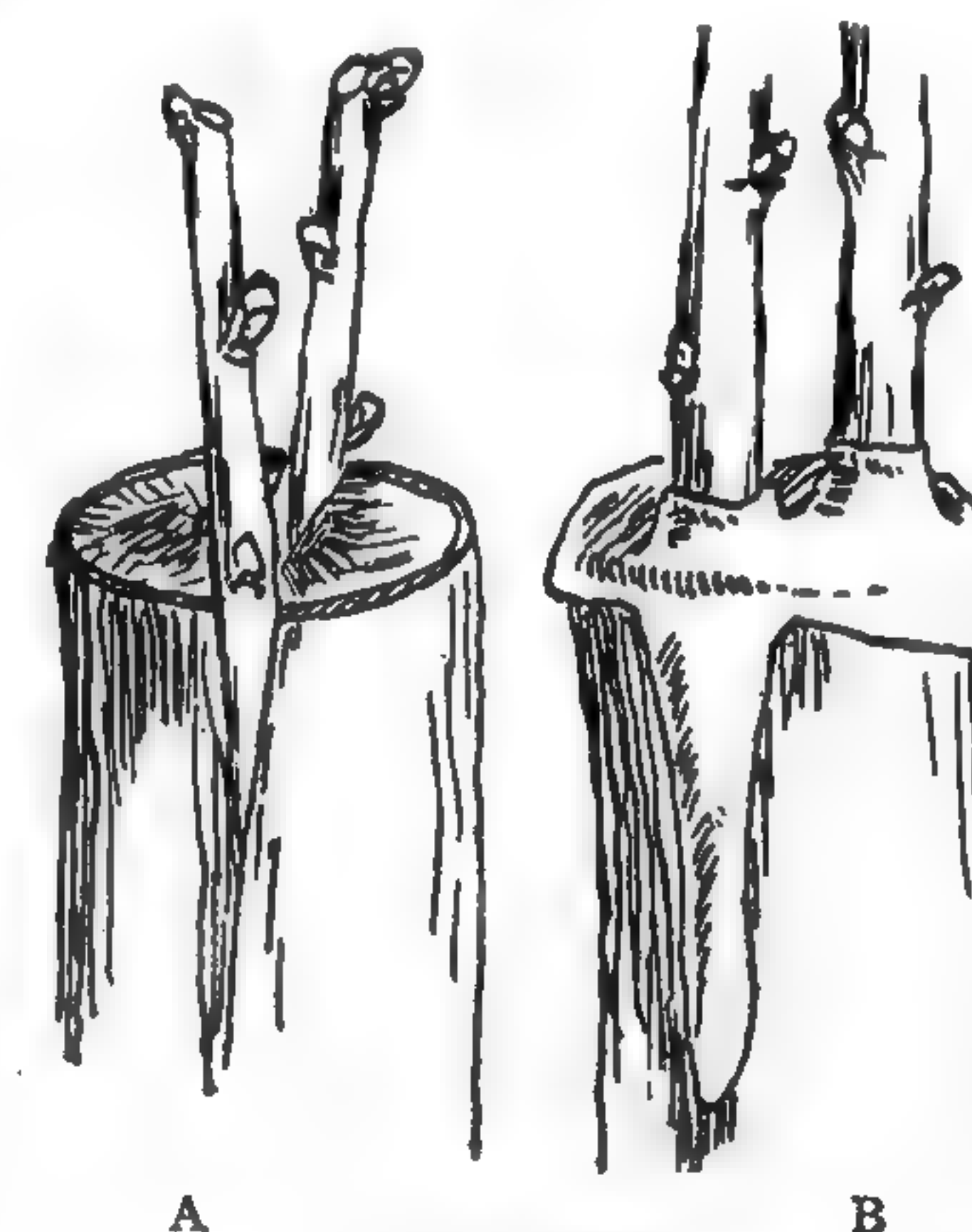
Tree seeds are treated the same as those of shrubs. Seeds, which, though hard, will not stand freezing, are often filed or nicked with a knife. The following tree seeds need to be placed in sand and frozen: Maples, Ailanthus, Birch, Catalpa, Chestnut, Beech, Ash, Hickory, Butternut, Black Walnut, Locust, Basswoods. A number of tree and shrub seeds should be sown immediately after ripening. The principal ones are: TREES—Birch, Chestnut, Elm, Hackberry, Horsechestnut, Magnolia, Maple, Oak, Poplar, Ptelea, Sweetgum. SHRUBS—Bayberry, Honeysuckle, Rose, Spirea.

Seeds differ greatly in their germinating power. The White Oak germinates quickly, the Black Oak slowly. The Ash seed is rather oily and benefits by being treated to a weak acid bath.

There are a number of reasons why seeds fail to germinate. They may have been immature when gathered. Pansy seed matures so some of the seeds are ripe while others are not. Some seeds upon becoming too dry, are killed. Seeds have often been stored while moist



Cions for cleft grafting



Cleft grafting

A, The completed graft. B, Properly waxed. The methods of grafting are explained in the text on the following pages

and heating has resulted which killed the vital germ of growth; while still others have been injured by insects and fungi before or after maturing.

GRAFTING

Trees which belong to the same variety or species may be grafted. In other words, a Baldwin Apple may be grafted upon a Baldwin or any other Apple. Sometimes plants of different species but of the same genus may be grafted; other times this is not true. Apple may not usually be grafted upon Pears; yet Quinces (of the genus *Cydonia*) have Pears (*Pyrus*) grafted upon them to impart the dwarf habit. We

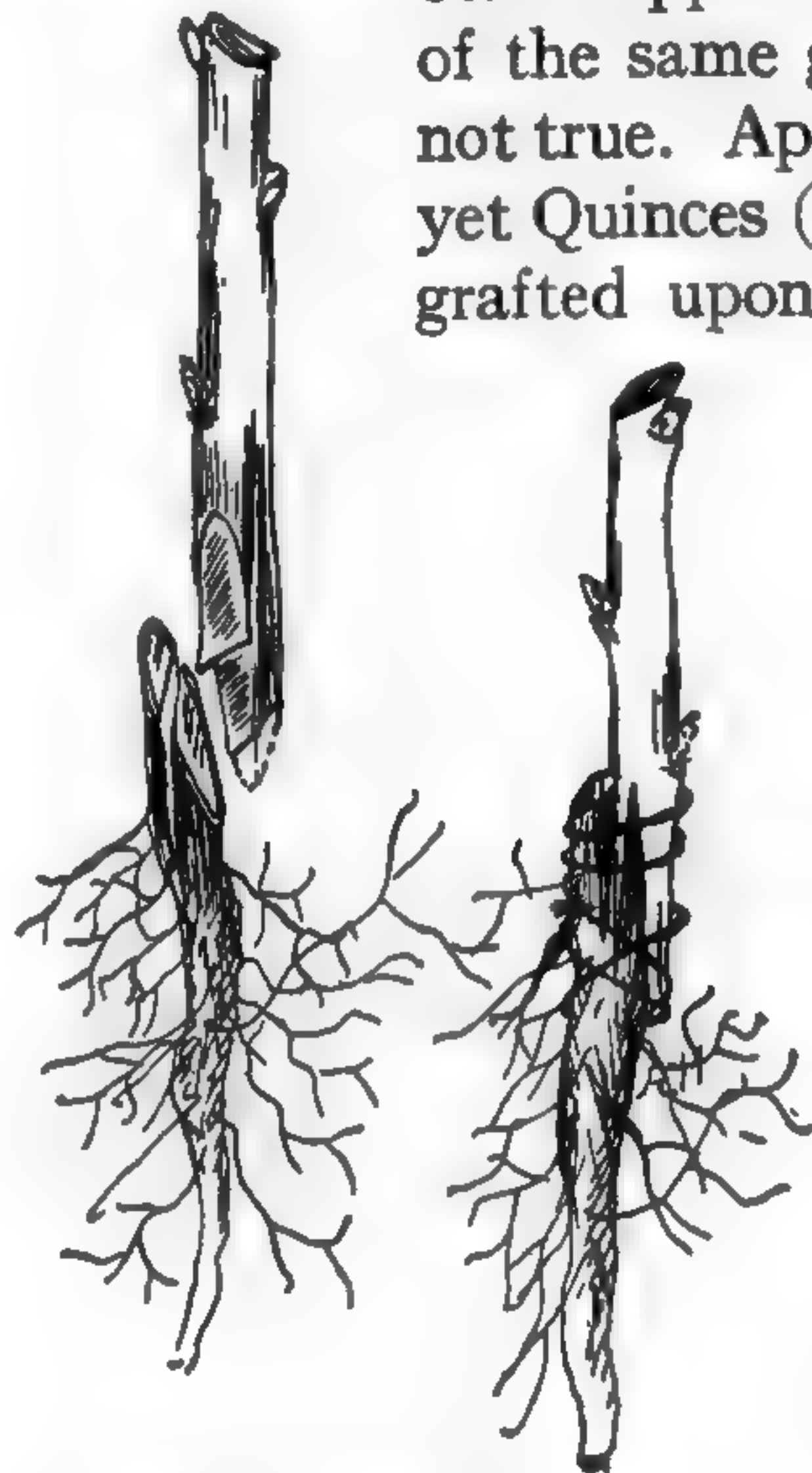
could never expect Cherries on Pear trees, or Red Raspberries on Grape vines, for it is only those plants which are very closely related that will allow grafting.

We have seen, as in the preceding case, that Pears may be kept dwarf by working them upon the Quince stock. We may, likewise, increase the vigor of a variety by grafting it upon a stronger growing species. A familiar example of this is the grafting of certain Roses upon the Multiflora and the Manetti Rose. Many times plants are grafted in order to render them more adaptable to adverse soils and climates. An example here is found in the case of Apples which are often grafted upon the Siberian Crab in order to render them better able to withstand intensely cold climates. Sometimes double grafting has to be practised,

especially with fine Pears, but this is a part of the subject we need not enter upon here.

Girdled trees may be grafted with a bridge graft. In most cases, however, the process of grafting is used simply to multiply the variety. Baldwin Apples are wanted; they do not come true to seed; cuttings are slower; so that some form of grafting is used.

When only a bud, instead of part of a shoot, is transferred, the process is called "budding."



Whip or tongue grafting

In grafting the stock and cion must be firmly bound around with broad raffia or other ligature. The above drawing is intended to show how to fix the graft, but the binding must cover the union thoroughly to exclude the air.

There is a fundamental necessity in all grafting work: The layer just between the wood and bark, the line where the bark peels, of both stock and cion, must be in contact. The *stock* is the plant grafted upon; the *cion* (also spelled scion) is the shoot or graft that is inserted.

CLEFT OR CION GRAFTING. There are a number of simple sorts of cion grafting. The method most used upon trees in which the stock is over one inch in diameter is called cleft grafting.

The branch of the stock which is to be grafted is cut off short. It is split or cut through the center and the crack opened to receive a short cion. If a sharp chisel is used for making the cleft, the cions will grow more readily than when the branch is split so that the edges of the bark are jagged.

The cions are best cut during the Fall and stored through the Winter in moist sand, but they may be taken directly from the trees very early when the sap starts in the Spring but before the buds have burst. The best length is three buds long, the top bud being the top of the cion; the lower end is beveled at each side to form a perfect wedge, as shown in the cut. This wedge must have the cut surfaces perfectly straight, not hollowed out, if the union is to be a good one. In inserting the cion two cambium rings must be together; this is the part between the bark and the wood. To be sure of this, slant the cion just a trifle. Then cover the whole cut area with grafting wax.

WHIP OR TONGUE GRAFTING. This is the next most common method. It is especially used upon small branches or for grafting seedlings. Apple seedlings may be nicely grafted by this method. Branches to be grafted must be nearly the same size. The stock should be beveled off with a long plane surface; the cion should be beveled the same way. Then each should be split so that the two tongues fit together nicely. Practice a bit upon some other wood and you will learn more by the experience than words can tell in description. As in all grafting, the layer between the bark and wood of each must be in contact on one side at least. This sort of grafting, like the former, should be done in Spring before growth starts. This graft may not be covered with wax, but merely tied firmly. A cord used for this purpose is usually No. 18 knitting cotton soaked in grafting wax. This is just strong enough to break when it should, before the branch is strangled. Generally it is wise to cut the cord as soon as one sees that the graft has taken.

BUDDING

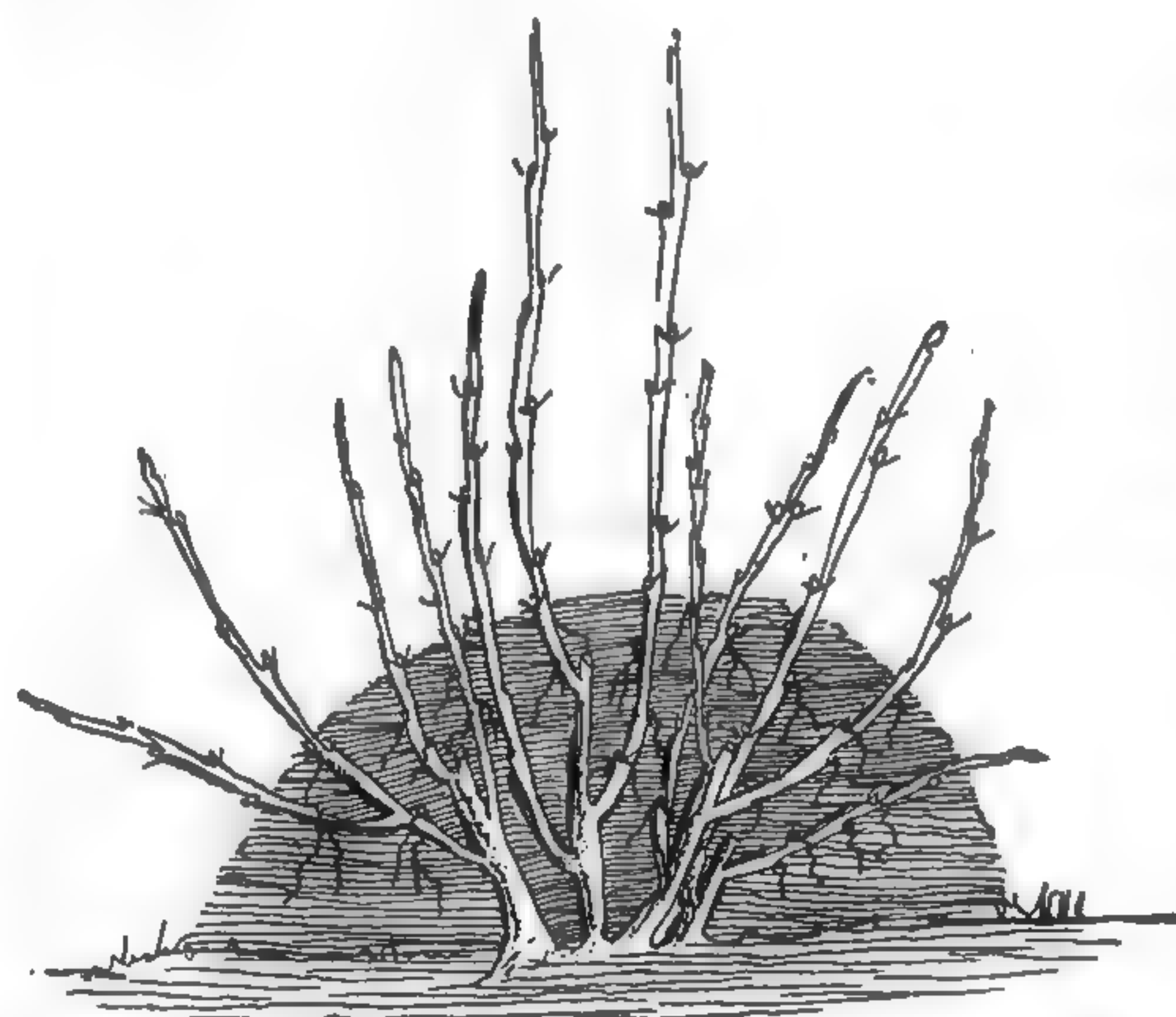
The simplest method of budding is known as shield budding. It consists of placing a shield-shaped piece of bark bearing a bud beneath the bark of the stock. A good, healthy, well budded branch is chosen; the buds are cut from it, holding the branch upside down. A T-shaped cut is made in the stock near the base of the plant; the free edges are carefully peeled back and the bud inserted as shown in the cut. The budded stock is then tied with yarn or raffia so that the bud is held firmly; all should be covered except the bud. Budding may be employed whenever the bark peels nicely, inasmuch as budding cannot be done unless the bark slips easily.

Prof. U. P. Hedrick, the expert horticulturist of the Geneva Experiment Station, gives the following dates for budding: Rose, July 1 to 10; Pear, July 10 to 15; Apple, July 15 to Aug. 1; Plum (St. Julien stock), July 15 to Aug. 1; Plum (Myrobalan stock), Aug. 15 to Sept. 1; Cherry (Mazzard), July 20 to Aug. 1; Cherry (Mahaleb), Aug. 20 to Sept. 1; Quince, July 25 to Aug. 15; Peach, Aug. 20 to Sept. 10.

LAYERING

Placing of some portion of a branch in contact with the soil so that it may root is known as layering. It is a very convenient, perfectly simple and certain method of increasing many plants. Grape canes, for instance, are merely bent down and a node or two covered with soil. They root readily and the new plants can soon be separated from the old one.

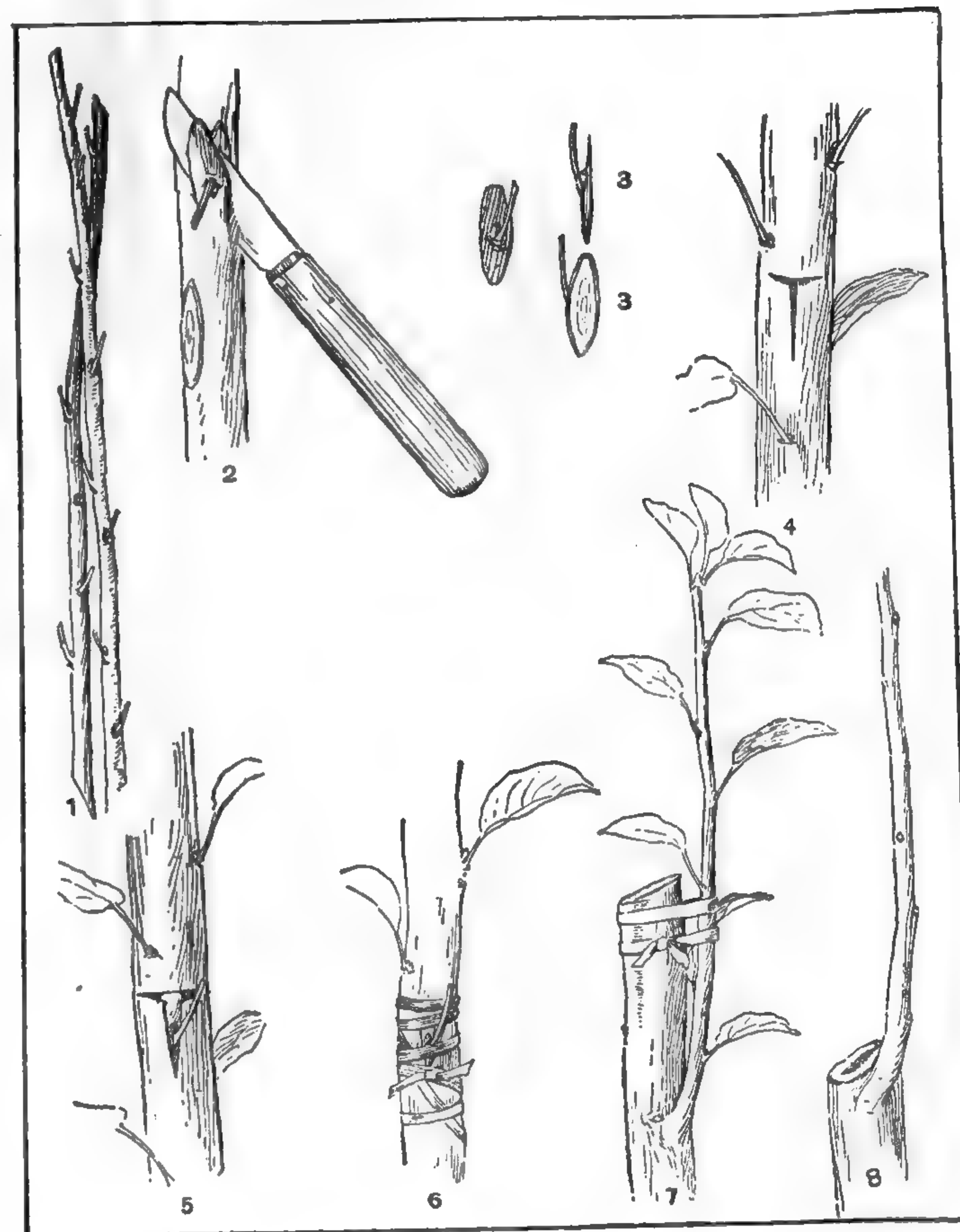
In another type of layering suited to Goose-



Mound layering of Gooseberries

Note that the shoots have been cut back previous to mounding the soil about the plants; each shoot is rooting nicely

berries and many ornamentals, a bush is mounded so that each shoot roots, making from five to twenty-five young plants instead of one. After they are well rooted the plant can be divided and each part will

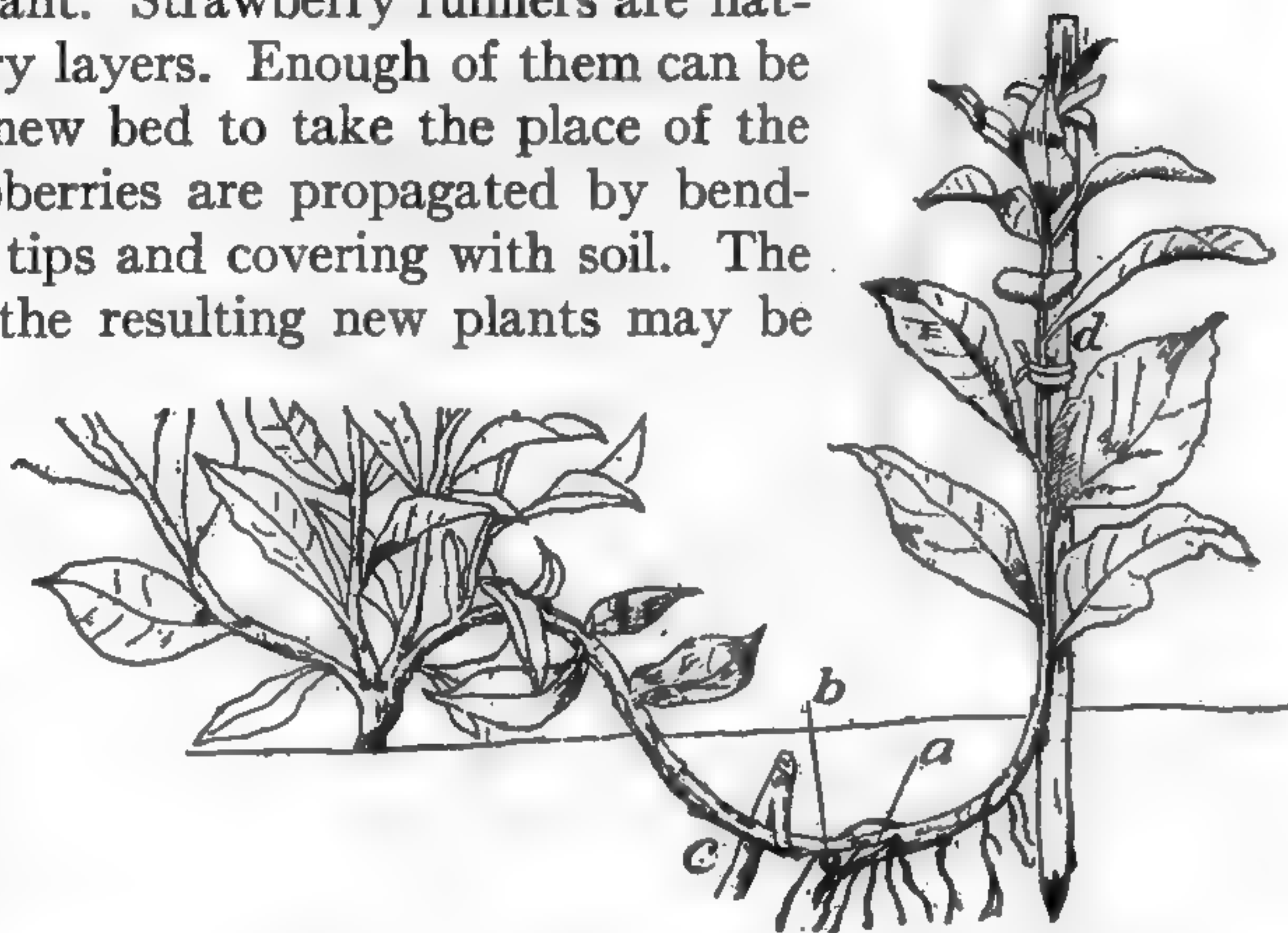


Budding

1, Shoots from which buds are cut (note that leaves have been cut off, leaving stubs); 2, cutting the buds; 3, the buds; 4, T-shaped cuts placed in bark; 5, bud inserted into T cut; 6, bud tied with raffia; 7, top of stock has been removed and the bud has grown (note that the new growth is tied to the stock to prevent its being broken off by the wind); 8, stub cut back to point of budding.—Adapted from Cornell Lesson 123, *Fruit Growing Series*.

be a separate plant. Strawberry runners are natural or voluntary layers. Enough of them can be left to start a new bed to take the place of the old one. Raspberries are propagated by bending down their tips and covering with soil. The tips root, and the resulting new plants may be transplanted.

Tomato stems root nicely when they touch the soil, and Squash stems may be encouraged to root at several places by covering their joints.



Method of layering a woody or half-woody plant
as, for instance, a Rhododendron or a Carnation. a, Slit or tongue cut half way through the stem; b, Pebble to keep slit open; c, Peg for holding down the layer; d, A stake to keep the shoot firm

*For a complete work on the subject of this
chapter we recommend*

PRACTICAL PLANT PROPAGATION, by ALFRED CARL HOTTES.

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Chapter XXVII

TRANSPLANTING

By S. MENDELSON MEEHAN

Soil Root Contact in Planting—What Is the Soil Like?—Care of Roots—Pruning the Tops—Shading New Plants—After Care—When to Transplant—The Transplanting of Trees and Shrubs—Moving Big Specimen Trees—Herbaceous Perennials—Seedlings—Hedges

THE operation of moving a plant from the soil in one place to that of another is known as transplanting. This embraces the moving of trees out of doors, the repotting of a plant, or the progressive change of a small seedling from its starting place to a permanent location. The principles governing the successful movings are much the same, no matter which of these different things is being done.

Every day of our lives we are doing many things that we have learned to do without knowing the details that actually achieve certain results; we are following formulas or rules that have been laid down for us, and as we follow them strictly our task is satisfactorily completed, though just why we may not know. But formulas and rules for the handling of living things are only valuable if used with an intelligent knowledge of the subject in hand; a period of experience develops especial skill, just such as a good diagnostician possesses in medical practice.

For a better appreciation of what we are doing when moving a plant, let us consider for a few moments what happens to the plant undergoing the operation. With very few exceptions, and these are mostly exotics, the continued life of a plant depends on the close contact of its roots with soil. It is from this soil that its food is drawn; it is the roots through which the food is taken, and finally it is water that acts as food carrier. While it may be stated in the main that plants must be kept with their roots continually in soil that these functions may not be interrupted, it is right to recognize that plants have resting periods when these functions are mostly suspended, and also we may frequently enforce rest or denial without serious injury to a plant. Some plants will suffer a change or an interruption of normal functions

without showing any ill effects. It is fortunate for countless numbers of people that the latter is so, for many there are who ignorantly disregard right principles for transplanting. Then, apart from root functions, there are the living cells in all parts of the plant to be considered. These cells contain moisture in varying degrees, and must not be allowed to "dry up" by the plant lying around under warm or drying influences. With a knowledge of these few facts, the proper handling of plants in removal is simplified. In lifting a plant, the dirt is not shaken loose but retained—a ball of earth it is called. In nursery parlance it is "balled and burlapped." Or plants may be grown in pots first, thus forming the required "ball." Very large trees are moved with balls that the roots may never lose contact with the soil.

In protecting roots so that they may not dry out, one method is to pack wet straw, shavings or moss in amongst them. Or if a plant is dug with no soil left on the roots, it may be temporarily "heeled in;" that is, laid on loose soil or in a hole in a leaning position and dirt thrown over the roots in a close cover.

SOIL-ROOT CONTACT IN PLANTING

There is probably nothing more important than to see that soil is packed in closely about all roots. Planting large trees and shrubs one may use a round wooden rammer, about 5 ft. long and 3 in. across the end. Earth should be filled in around the roots by one person while another rams the soil into good contact with the roots. But many times nothing will accomplish the purpose without the use of fingers poking the soil into small spaces. It is usually a mistake to fill the hole full with soil first and then ram it; the upper contents of the hole may thus be packed tight without compacting the lower around the roots. And what is said about planting larger things applies only in a lesser degree to small ones. Even transplanting seedlings and small pot plants requires the light pressure of fingers and thumbs to insure a firm setting of soil about them.

With large trees, a flood of water is frequently used to wash soil in around roots, but this is not always satisfactory where soil is heavy and does not wash in small particles. There is, however, the excellent fulfillment of the requirement to keep the roots adequately supplied with moisture.

WHAT IS THE SOIL LIKE?

Any consideration of handling soil and the use of water in planting demands some understanding of soil itself. Firstly, heavy, clayey,

sticky soil alone is mighty poor for growing any plant. Mixed with liberal proportions of some lightening material as sand, gravel, ashes, peat or humus, it has valuable qualities. A tree hole dug in clayey soil should be 2 ft. wider and 1 ft. deeper than otherwise to give the roots a good start in new mixed soil. One may even dig a trench away from such holes, filling it in with broken stone or cinders to deliberately drain off excess water if the ground is that kind. Secondly, take the other extreme, light or sandy soil: It will be easy to pack this soil closely about the roots, but in all likelihood it will be too dry. Soil like this should be mixed with heavier soil, peat, humus or well-rotted manure. These retain moisture readily.

Top soil is a term applied to the upper strata of soil that has become rich and vital in the process of cultivation, fertilizing, or benefited by decaying vegetable matter, and is aerated by Nature. The average depth of good top soil is about 8 in. though there are sections of the country where this rich, fertile soil spreads to a marvelous depth. Although the depth of top soil must always be an imaginary line, it is usually possible to distinguish a difference, for the upper is usually dark, friable and fresh. Bottom soil should always be discarded, well mixed with good soil, or given the top position.

CARE OF ROOTS

Trees must not be dug by maulers—men who hack recklessly around the roots, pull twistingly on the top to wrench the tree loose, and otherwise treat it as so much lumber. A plant may not need all its roots in moving, but one's first aim should be to get all roots, and to have them sound and uncut. After that one may with discrimination, shorten long, heavy roots which are mainly support roots, and preserve the smaller fine roots which are the feeders.

Broken or bruised roots should be cut off with a sharp, clean cut. A sharp knife or pruning shears should always be part of digging or planting equipment. Roots should not be bunched together unnaturally so that earth cannot get in around them; they should be spread somewhat apart, but not spread in such a way as to go to the other extreme. Observe the natural direction of root growth in each case.

PRUNING THE TOPS

Roots are sometimes pruned because, from a clean cut new and numerous roots are likely to spring, to the plant's advantage. But tops are pruned for a different reason. Roots have the function of gathering

food and moisture from the ground to support the tops. Prior to removal, the tops balance the roots; that is to say, the roots are in a position to fully meet the needs of the plant's top. But the plant undergoes an operation; its roots are disturbed, and it cannot do so well by the top. To satisfy this reduced root function, the top is pruned or shortened, giving the root less to support in its disturbed situation. Top pruning is less necessary in Fall than in Spring, for the reason that sap is practically inactive, and the roots have a chance to become rehabilitated before growth is resumed the following Spring.

Softwood trees, such as Willow, Poplar, Silver Maple, etc., should be pruned much more severely than hardwoods like Oak and Hickory. Branches of the latter may be cut back hardly more than one-fourth, while the softwoods may be cut back to within a few inches if it seems desirable. The pruned tree usually grows much more vigorously the first year than one not pruned, and there is no real setback in pruning.

SHADING NEW PLANTS

Reference has already been made to the importance of not letting plants dry up in the process of transplanting. But drying may take place after the moving has been completed. Before the roots are re-established and functioning, the stems may lose much moisture through evaporation. A warm sun or drying winds may draw out the moisture quickly. To avoid this, wrap the leading stems with burlap or other material. Bunches of straw or even paper may be tied around the main stems. Evergreen shrubs like Rhododendrons or Boxwood may have a low screen erected on the sunny and windy quarters, even over the top of low plants. It is seldom necessary and is rather undesirable to completely envelop the plant. Very small and young plants are usually shaded by lath sash or shelters of cheese cloth. If under glass, the panes may be brushed with whitewash or liquid mud.

AFTER CARE

When a plant is set in permanent position, and the main operation is completed, it must not be thought that is all there is to do. The plant should be visited with some regularity for a while to see that everything is going well. If the bark of young twigs seems to shrivel and turn brown, the ground may have dried out or the plant may not have been adequately pruned. The pruning may yet be done. The surface soil around the plant should be stirred lightly and a soaking of

water applied. A mulch of peat or litter will conserve moisture, obviating the necessity for much repetition.

With large plants—heavier ones especially—if the soil has not been very firmly tamped around the roots, it may later be found that the tree has swayed in the wind, and become loose in the ground. The evidence of this will be clearly shown by a circular vacancy around the stem at ground level. It will frequently be sufficient to remove a little of the surface soil and with a thick stick pound the soil tightly around the plant. Then replace the surface soil, just lightly firming it. Do not tamp the surface to obtain the desired end. Trees 6 ft. high or over, and subject to swaying in the wind, should have wires strung around the upper parts, the extreme ends fastened to stakes in the ground, set in three directions. (See further information on guying trees on pages 401 and 402 devoted to moving large specimens).

If the nurseryman has attached labels to the trees, see that wires and strings are just loosely attached if they are to remain, and never left on leading or important stems. If a wire encircles a stem, though it may not at present be tight, the stem as it increases in size will be cut and injured seriously, if not fatally. Not a little damage is done in this way.

WHEN TO TRANSPLANT

Some plants can be moved so easily they can be handled in almost any month. Others are sensitive to change at any time, and must be moved under the most favorable auspices. From this latter statement, it will be seen that one must not be suspicious of quality or fault-finding if there are occasional losses with purchased plants.

Planting times differ in various localities. In the Southern States it begins in what would be early Winter northerly and continues without interruption till Spring. In the North the planting seasons are distinctly divided into two, Fall and Spring. Far north where Winters are long and Summers short, Spring planting commences after Pennsylvania, say, has completely finished, and it is a short season, though less trying.

The digging of plants with balls of earth, or with smaller plants carrying them in pots or small tubs, makes planting feasible after a Spring season has otherwise closed. An increasing number of plants is being handled this way. It is on the whole very satisfactory, provided water is used quite liberally in planting if the weather is hot. No mat-

ter how well prepared the plant for removal, if its new position is much more exposed to heat and winds, it may nevertheless feel the change.

Early Fall is considered very favorable for moving evergreens; late Fall not at all good. But if the Summer ends up excessively dry, one should wait for rains.

Deciduous plants should not be moved too early in Fall, except those kinds that ripen growth early. Softwoods keep on growing late, and the wood does not ripen well until frosts. For this reason, in cold climates, such plants are better planted in Spring.

If trees, especially evergreens, are to be set in bleak positions where they will be badly windswept the first Winter, Spring planting is preferred, as it gives the plants an opportunity to become somewhat established before facing the Winter storms. By the same token, however, the position may be equally trying in Summer, and the question must be decided according to facilities available to either shelter the trees over the first Winter, or to keep them from drying out in Summer.

A very natural time to move a plant is at the beginning of its normal growing period, all else being equal, and provided the roots are not badly disturbed. Just when the sap circulatory system is in a progressive stage, when roots and buds are on the verge of activity, successful transplanting is most promising. But excellent handling is necessary. Withering may take place quickly under the least neglect. If the exact stage is passed, the danger is heightened. Plants like Willows, so easy to move while still dormant, may die quickly if moved in young leafy growth without severe pruning.

Most herbaceous perennials are well moved in early Fall, though young plants with but small roots must be protected in cold climates from being thrown out by the freezing and thawing of ground.

In temperate climates, Willows, Poplars, Soft Maples, Oriental Planes, Cherries, Tuliptrees, Magnolias, Peaches, Oaks and Dogwoods are usually considered safer for Spring planting.

Winter storms are hard on almost all plants; therefore, newly planted ones must be given every good condition to carry them through. Assuming that soil is first properly drained to prevent roots standing in water much of the Winter, it should be seen to that plants do not enter a Winter severely dry, especially evergreens. A dry, hot Summer preceding a bad Winter causes many deaths that are often attributed to Winter failures only.

Newly planted herbaceous perennials should be mulched to assure equable temperature and moisture. But care must be exercised with

certain plants whose crowns rot easily (Foxglove is a good example) that the mulch is of a nature for water to drain through. Straw mulch is good; leaf mulch not so favorable.

Because of so many differences in climatic conditions, and in the individual characteristics of plants, it is always advisable to consult someone in your vicinity, especially the nurseryman, as to when to plant where there is the slightest doubt.

THE TRANSPLANTING OF TREES AND SHRUBS

It will be assumed that our plant has been dug carefully and prepared for planting on the principles of handling discussed on page 392. What size holes should be dug, and how should they be prepared for the roots?

No single rule can be laid down for the size of holes. The length and spread of roots vary in the individual. On the nature of the soil will depend the size and depth of hole. Experienced planters come to know about what to expect if they know the kind and size of tree to be planted, but even they may have to cut or fill a little.

These following principles will serve as a guide:

(1) If the soil be heavy, clayey, or excessively wet, dig deep and wide, but fill back with suitably mixed earth or drainage material, and *plant shallow*. As to the latter, there are circumstances under which the roots may be scarcely more than two-thirds in the hole, and the soil mounded up around them. This is an extreme situation, of course.

(2) Roots should never be "buried." The nearer the surface they may be without exposure, giving ample anchorage, the better. The accepted plan is to set them an inch or two deeper than they were in their original position, as easily seen by the color and condition of bark at the collar. Low grafted plants should usually be set just below the point of graftage.

(3) Holes should be wide and deep enough to make it unnecessary to bend or twist roots out of their normal position. In hard or stony ground, there should be enough new soil for new roots to advance without resistance. Roots that are characteristically numerous and close together should be just sufficiently spread to admit of getting the new soil in amongst them without leaving pockets of air. The sides of a hole should be perpendicular and the bottom flat and level—not concave or basinlike. With ample working room around the sides when the plant is set in position it is then easy to keep the plant erect and the earth packed in around the roots with no air pockets.

(4) In digging a hole the top soil (the first 8 to 12 in.) should be put to one side to be used in planting. The soil beneath that is generally poor and should be discarded, or at least mixed with better material. Good soil next and around the roots; the poorer soil above. The very top layer that is filled in should always be porous and not easily hardened and baked by the sun.

(5) Always add a fertilizer, if possible, mixing it with the soil that is filled in rather than putting it on top. However, concentrated commercial fertilizers or raw manures should not come into contact with the roots. If well mixed with the soil, and the ground finally well soaked with water, however, one need not be over-cautious in using fertilizers moderately.

(6) Most plants like peat and humus in which to root, and either may usually be liberally mixed with the soil in the hole.

Removal of Burlap. Plants dug with ball and burlapped are taken right to the holes prepared for them and set in place. If the balls are quite intact, the burlap can be lifted from around them. But if to remove the burlap means the breaking away of the soil from around the roots, let it remain. There is no harm resulting provided all rope and tight bandaging around the stem of the plant is removed or loosened, also provided the burlap is not pushed down in such thickened folds as to make it impossible to pack soil well around the ball. New roots easily penetrate the burlap. Indeed, the burlap will rot quickly and virtually disappear.

Use of Water. There may be two purposes in watering plants at the time of planting. First, to assure needed moisture for the roots that they may function promptly in obtaining food and supporting the living cells. Second, to aid in compacting light soil and washing it in around the roots. But never flood the hole with water until it has been three parts filled with earth in the best manner possible to get the soil compactly around the roots. Water should not take the place of tamping or the use of fingers. It is a final resort. Water is not so effectual in this way if the soil is heavy. A flood of water with some considerable pressure is good, but let it soak in before filling in the rest of the earth. Do not make a mud puddle. Do not pound down the wet soil in any way. Fill in the upper level with just moderate firmness.

Guy Wires. Larger trees, subject to swaying in the wind, should be promptly guyed with wire strands. (See instructions on pages 401 and 402 devoted to moving large specimen trees).

Planting Distances. Many mistakes are made in not spacing plants properly. The nursery plant comes in immature size, and the planter fails to visualize the extent to which it will soon grow. One should carefully learn the plant's characteristics before going ahead. In another chapter (page 119) will be found approximate distances for trees. For shrubs, give dwarf kinds from 2½ to 3 ft.; medium sizes, 3 to 4 ft.; large sizes, 4 to 6 ft. There will be times when the fullness of a group is important, and compromises must be made. Smaller plants edging a group may have to be a little close, even if somewhat overhung later by the larger. Two or more plants of any one kind may usually be set closer together than two different kinds, as they will knit together harmoniously. Shrubs should not be set too near a building if they are large and rank growing, or there will be a toppling-over effect.

Shrub Pruning. It is a pretty safe rule to cut back shrubs at transplanting. The flowering wood may thus be lost for the first season, but there will result a much more pleasing growth and future fine flowering. Where the shrub is very bushy, and there are small, weak branches among stronger ones, good pruning results are had from simply thinning them out, cutting the poorer wood away entirely and leaving the strong untouched.

Mulching. In Fall or Spring planting, it is good to leave a mulch of litter on the surface of the ground around the transplanted plant. In Fall it serves to preserve an equable temperature, and guards against the frost heaving out smaller plants. In Spring it conserves moisture, and keeps the surface soil from getting hard and impervious. Four to 6 in. of peat may constitute the mulch, or long, strawy manure, salt hay, grass clippings, etc.

Finally, do not worry about getting a tree set according to the compass, agreeing with the way it was formerly growing. The slight advantage there might be will be many times offset by new conditions and exposures. The position of the moon is of less concern than the intelligent use of brain and the exercise of muscle in setting it thoroughly well in the soil.

HERBACEOUS PERENNIALS

These notes are for the guidance of those who are taking up old plants, dividing and resetting them, as well as for those who may just be planting an entirely new bed.

There is a particularly good reason why old beds should be overhauled every four or five years. Unlike shrubs and trees, perennials seldom develop a branching root system from a single root base. Rather do they develop additional plants closely surrounding the parent which have independent flowering stems and supporting roots, but are still attached and entangled with the roots of the parent. Naturally many growths and roots crowded together in this manner exhaust the soil of available moisture and nourishment. They cannot exist in that manner for many years. To better the situation, the careful gardener digs up such plants and literally tears the clumps apart. These severed parts will each have ample root and a crown with which to lead an independent existence.

Most perennials may be divided and reset, or new ones planted to good advantage in early Fall. Actually, many persons leave all gardening for early Spring. Spring flowering subjects and rock plants are best planted in Fall, if properly mulched to keep them from heaving out in climates where there is much freezing and thawing.

Mulching. Granulated peat is one of the most convenient and safest of materials for mulching. Straw, salt hay and stems of plants are good, for they shelter without danger of retaining too much moisture, something many perennials abhor. Coarse manure and leaves are frequently used but should be placed *around* plants rather than over them. Cut evergreen boughs may be used, and are especially good for rockeries.

Depth of Planting. The top of any plant may be said to commence right at the surface of the ground. An herbaceous plant has its top to die back to that point. Naturally, in planting one would set the plant so that this growing point is just barely covered with soil. The roots will be amply covered.

The roots of perennials are frequently numerous and bunched together. One is always told to spread out the roots in planting, but this does not mean raising them to abnormal positions. Observe the natural tendencies of the roots, and give them their normal position, separating close roots just enough to get the soil in amongst them.

Distance. One may arbitrarily assemble different perennials into three groups—tall, medium and low. Assuming that most perennials are planted in rather long beds about 5 or 6 ft. wide, tall varieties may be set 2 ft. apart, or even 3 ft. if they characteristically make spreading tops; medium size, 18 in.; low, 12 to 15 in. apart. Until one has some experience with different kinds, these figures will not be wholly satis-

factory. Be sure, however, to keep the ground fairly well planted up. A thinly planted bed of perennials is usually unsatisfactory.

In giving the foregoing figures, it is assumed that young or divided plants are being set out. Old clumps are good for immediate results, but will not be lasting. With an entirely new bed this is often the most satisfactory thing, however, even if division and replanting must be undertaken in another two years.

Annuals and Bulbs. The fact that herbaceous perennials mostly bloom in succession, according to kind, frequently brings disappointment because there are times when flowers are few. To overcome this, it is quite practical to allow spaces where favorite annuals and bulbs may be included.

Planting Beneath or Near Large Trees. The roots of large old trees dominate their surroundings. It is futile to plant perennials very near them, except certain kinds which have been proven adaptable to such situations. What are known as "cover plants," of which *Pachysandra* is a notable example, are commonly used beneath large trees. It is interesting to experiment with various subjects that are recommended. The important thing is to prepare the soil well by digging it up to a depth of 6 in., putting in fresh top soil to which peat may be added. When peat is used, it is important to see that it is finally well watered, for unmoistened peat is a mighty dry subject. It is seldom difficult to get plants to grow in partial shade, the real obstacle being suitable soil.

MOVING BIG SPECIMEN TREES

Perhaps the best instructions for moving big trees given to the average persons is "Do not attempt it." And the reason for this negation is that few of us have the facilities for doing it properly. It is easy to dig around a tree and get a fair ball, but skill and experience are required to even put the burlap wrapping in place. This must be put on smoothly and closely applied at every part. The burlap must be tied on, "laced" so deftly that the ball will not "mush" when moved. A square wooden "platform" or base must be carefully thrust beneath the ball and the latter securely fastened to it. Then the hard work has just begun. A runway and planks are laid from the hole to the truck on which the tree must be loaded. A winch is in most cases an essential to pull the tree out of the hole and up on to the truck. There are special tree-moving machines to expedite this work, though much good work is done without them, with ordinarily good equipment. The answer is, engage an experienced, well equipped tree mover for work

of this kind. In good hands, hardly any moving is impossible. A typical tree mover is a cool headed person who proceeds deliberately but confidently, accustomed to heavy work. This man seldom makes a good flower gardener, but, in his own big work, is a master fascinating to watch.

The setting of a big tree in the hole is of deep importance. The bottom of the hole should be flat and level. There must be ample working room around the sides. If necessary to tilt the ball a little to put the trunk perpendicular, soil must be evenly packed under the ball when tilted. In proper hands, a tree can be turned around in the hole to get the proper side forward. It is done by twisting motions usually.

Fill in hole with about one-third earth and tightly ram it; then fill in with more earth, washing and packing same by a flow of water from a hose. The last 8 in. of earth should be neither tamped nor flooded; it should consist of a light, porous surface, of which peat may well form a large part. If done in Spring, there should be a rim around the tree at a distance from the trunk to form a basin for catching water.

Large trees should be kept from swaying in the wind by three wires stretched from the main trunk, 6 or 7 ft. up, and anchored in the ground by short logs buried in the ground 6 ft. out from the trunk.

SEEDLINGS

It will be assumed that our readers are mostly interested in seedlings of annuals and not of trees and other large plants. While there is much of interest to be found in the latter, it takes so much longer for results, most persons will prefer to leave them to the commercial grower.

Seeds may have been sown in the open ground in Spring where a cluster of plants is desired, or in frames from which they are to be transplanted later to permanent positions, or in flat boxes from which they may be conveniently moved to the open when ready. On the first named plan, the need is to thin them out, for one can hardly sow small seeds so sparsely as to allow all to grow exactly where they started. If a great many seedlings have come into existence, the thinning out may be to discard those removed. This should be done after they have all grown to a height that will show which are the stronger and more promising plants. But if to be actually transplanted to roomier positions, these, like seedlings under other circumstances, should be transplanted *soon after the second pair of leaves is formed*. If left longer they are likely to be weak and spindling.

Those sown first directly in frames may have been started quite early with the idea of growing them on to a larger size, to be planted out permanently as soon as all danger of frost is past. "Growing them on" may mean transplanting the small seedlings to other sections of the frames either at large, in flats, or individually in small pots. There they will develop under good culture to strong, ready-to-flower plants for early planting out.

For use in transplanting, a flat, sharp pointed trowel of quite small size will be found very useful for removing the small plants. For very small seedlings, a pair of tweezers is handy. To make small holes to receive the transplants, some use a dibble. This is a round pointed stick or metal piece which is easily thrust in the ground. One must be deft to use this correctly, however, so that the soil is properly pushed back around the root, and not just closed at the top, remaining open in the lower parts.

It is more important to have enriched soil for transplants than for the first seed stage. The roots are now at the feeding stage, and ravenous. Finely sifted manure, peat or leafmold mixed in equal parts with loam and sand, will make excellent soil.

Moisture is of tremendous importance to the newly planted seedlings. If after preparing the soil in the first place, and having insured its being porous, the ground is watered and allowed to drain for awhile, it will then be in condition to receive the seedlings. In poorly prepared or heavy soil, this is not so feasible. Soil is more easily handled practically dry, but then the transplants should be watered immediately with a fine spray.

Most plants just moved will appreciate shading from the direct rays of the sun until they have made a little recovery. This also insures conservation of moisture in a mild way.

ROSES

See Chapter VI, "The Rose Garden."

HEDGES

The simple and practical way to prepare for planting a hedge of any kind is to dig a trench. Even evergreens that are being set fairly well apart will develop better and can be spaced better if a trench is dug for them. A trench for plants one or two years old can be just a spade wide and deep.

Soil should be well prepared and fertilizer used, preferably manure, for while a hedge is expected to be dwarf it must nevertheless be healthy and vigorous. Give it a good start.

The best results may be had from plants that are set rather close together, except with evergreens. The latter should be started off with plenty of room. A one-year Privet or a slender two-year plant may be set as close as 6 in.; 9 in. if the plants are very bushy. Older, bushy plants may be 12 to 15 in. apart. Set Hemlock and Norway Spruce 2 to 3 ft. apart, according to size.

Consideration should be given to the ultimate form of the hedge. If desired very broad at the base, deciduous plants may be set in a double row, staggered. Fifteen inches apart in the row, and the rows 6 in. apart will be found about right. Evergreens are never set in a double row, as they grow wide at the base anyhow and would fail to fill in properly if staggered.

A deciduous hedge of the Privet type is always better for severe pruning at the start, no matter how bushy it may be. Plants 18 to 24 in. high should be cut down to 4 in.; 2 to 3 ft. cut to 6 in.; 3 to 4 ft. cut to 1 ft. Coarser growing plants like Beech and Hornbeam may have side branches cut back, but little of the leader. Evergreens may have a light pruning. Hemlocks will stand considerable pruning if felt desirable.

FRUIT TREES AND SMALL FRUITS
See Chapter XXI, "Fruit for the Small Garden."



Chapter XXVIII

WINTER PROTECTION

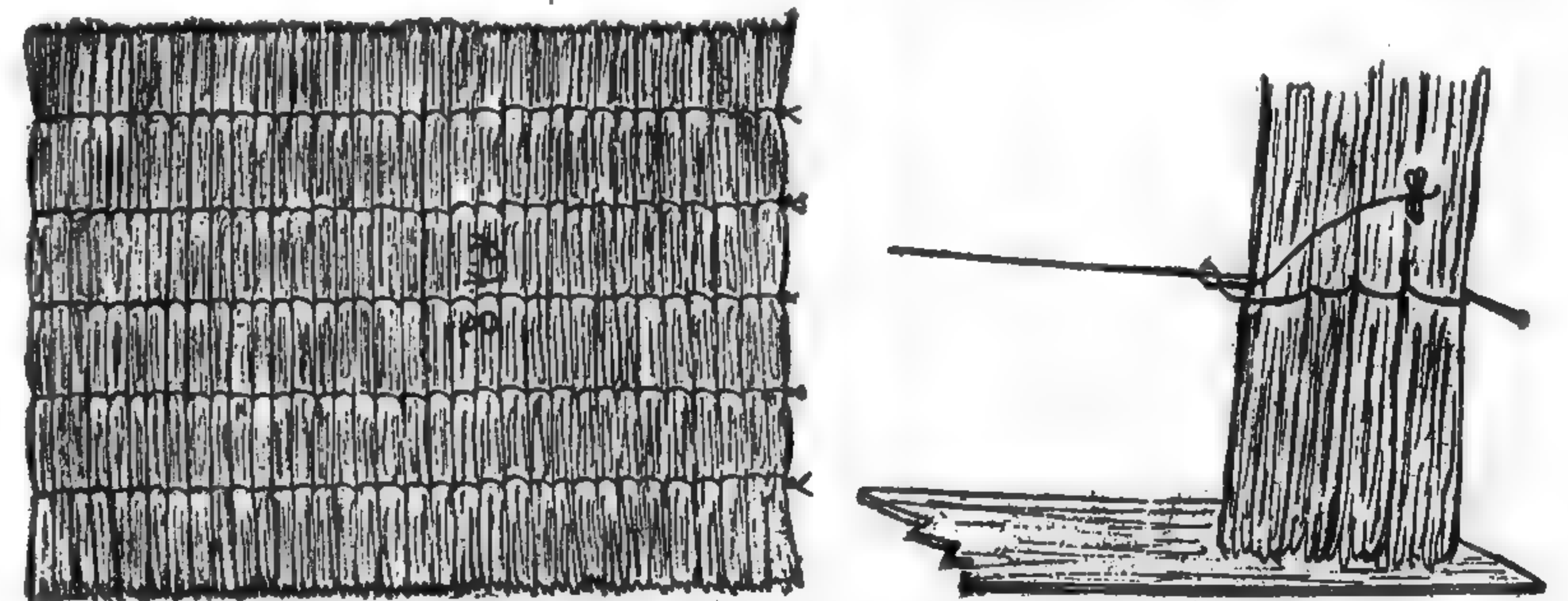
Leaf Coverings—Protecting Lilies and Roses—Windbreaks for Trees and Shrubs—Covering Tender Plants—Facts about Frost

THAT plants or shrubs may withstand the cold, we protect them; but it is mainly to shield them from the Winter sun. Some plants may be heaved from the soil by frosts; when thoroughly protected such heaving does not take place.

Many of the perennials are benefited by a protection in Winter. The sort of protection perennials need is one which will shield them from Winter and earliest Spring suns, which start the plants into growth only to be frozen again when the sun has set. This alternate freezing and thawing is the main cause of Winter injury to shrubs as well as perennials. The proper protection, then, is a light layer of straw, peat moss, manure or leaves applied after the tops have been killed by frost.

LEAF COVERINGS

It is usually better to wait until the ground is a little frozen before applying the Winter mulch. It prevents a premature start in Spring, due to a slight heating caused by fermentation. Perennials which

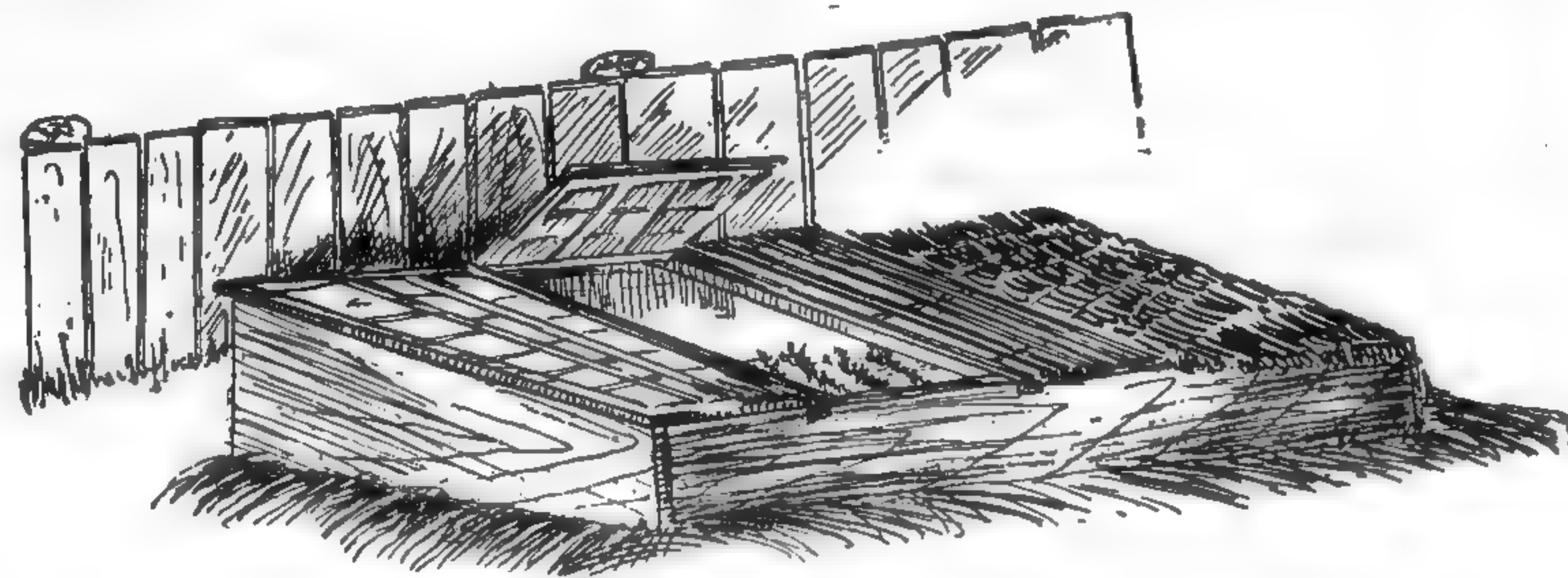


Straw or Reed Mats

It is a fairly easy matter to manufacture a good, stout reed mat or straw mat for protective purposes. A ball of stout cord and the necessary material for the mat; a little dexterity in binding these into bundles and in twisting the cord, as shown in the drawing, is all that is necessary. These mats can be put to a dozen good uses. Supplied also by the seedhouses

retain their leaves through the Winter, as well as biennials and Sweet-william, Heuchera and many others, are best covered with straw or leaves, but not manure, which often disfigures the foliage due to its decay. An excellent method, however, is to cover the beds with evergreen boughs and then place leaves upon these, in which case the leaves are prevented from matting. Leaves which mat together badly, as Elm, Maple, and other trees which drop their foliage early, are not as valuable as Oak. Coverings which are too thick cause a premature start in Spring, resulting in crippled growth because of the late frosts.

Unless the perennials are diseased the tops may remain during the Winter; breaking or cutting them off often exposes the growing points.



Another Form of Winter Protection

The ordinary coldframe, especially if covered with mats in hard weather, is sufficient shelter for all that class of plants which are spoken of as "doubtfully hardy." Parsley can be wintered here; Violets can be grown and flowered in deep frames; tender Roses and shrubs for placing out of doors in Summer can find a place

PROTECTING LILIES AND ROSES

For protecting Lilies a mound of ashes, placed over the crown, is frequently advised. The Tiger, the Canada, the Coral, the Hanson, the Thunberg, and the Turkscap can be successfully protected in this manner. We have had occasion before to mention the protection of the Desertcandle (*Eremurus*), which consists of using a deep box filled with leaves and left over the plants till rather late in the season, otherwise the young shoots will be injured in the Spring.

Then there are the Roses. When rosarians get together they discuss varieties for a time; then the question usually arises: "What do you use for protecting your Roses?" "Well," says one, "I believe that a protection for Roses should be merely a sunshade, not an

overcoat, so I just turn a box over the tops of the plants. They always Winter as well that way as any other." "They really need some protection from the cold," says another, "and I think the only way to protect Roses is to mound up all the Teas and Hybrid Teas so that the soil is almost a foot deep all around them." The third gentleman says that the protection afforded by something placed on their stems, such as rye straw, is best, although paper is an excellent insulator against the cold. Climbers are well protected by laying them down and covering them with evergreens or wrapped in burlap. Any sort of frame packed with leaves is a trifle dangerous, for the leaves are apt to ferment and cause the young shoots to start prematurely. Many persons dig their Teas each Fall and store in coldframes, which usually keeps them perfectly but is rather troublesome.

WINDBREAKS FOR TREES AND SHRUBS

For many trees and shrubs a windbreak will be the proper sort of shelter from the drying winds of Winter. Trees are apt to be injured in Winter by the loss of water by evaporation from the twigs; this cannot be supplied by the frozen roots, and the plant dies. Temporary fences may be erected of boards or cornstalks which will give the required break to the full sweep of the wind. Such protection is placed on the south side of broad-leaved evergreens to shield them from the Winter sun. The branches of either deciduous or evergreen trees should be tied up when the trees are somewhat columnar and are susceptible to breaking by wind or snow. This is especially necessary with Irish Juniper.

Tender plants and newly set trees, evergreens and others, are successfully protected by tying them together and covering with Hemlock boughs. Other trees and shrubs are covered deeply so that the roots do not freeze, in which case many are encouraged to grow under adverse conditions.

It is the alternate freezing and thawing of the trunk and branches of fruit trees that causes them to crack open on the south side. Low heading is the wise precaution, but trunks may be shaded with burlap or thin wood veneering tied around them.

FACTS ABOUT FROST

The Weather Bureau recognizes three degrees of frost—*light*, when the tenderest vegetation, such as Peppers, Melons, Eggplant, Beans, Heliotrope, Coleus, Nasturtium and Salvia, is injured; *heavy*,

when the hardier sorts are damaged and the tender ones quite destroyed; and *killing*, when the staple crops of the region are killed.

In the garden the first type is commonly the most disastrous because it comes with the least warning and occurs early in the Fall and late in the Spring when the gardener is off his guard. Moreover, the first Fall frost is usually followed by some weeks of fine, mild weather during which even the tender plants, if they had been protected during the cold snap, might have continued to grow, blossom and ripen fruit.

Notwithstanding the claims of so-called "weather sharks," it is impossible to consistently forecast local frost without systematic knowledge of conditions over a wide area. It is far better to rely on the experienced, scientifically worked out predictions of the Weather Bureau, reinforced by a knowledge of the conditions that are favorable to frost occurrence. Then when frost warnings are issued one can judge whether or not precautions are essential in his immediate locality.

CONDITIONS THAT SUGGEST FROST

1. Weather comes in "waves," hence an abnormally warm spell during the frost season is liable to be followed by a sudden drop in temperature.
2. A clear sky permits increased radiation and improves the chances of frost.
3. The passing of a storm is usually followed by "clearing and colder," which often means a frost.
4. A still, clear air with a steadily falling temperature in the late afternoon is a good sign of frost.
5. Frosts are more likely to occur in the open country and in small villages than in and near large cities; they occur on lowlands and in "pockets" and valleys sooner than on hillsides; they are less frequent near bodies of water than away from lakes, the ocean, etc.; northern, western, eastern and southern slopes are frosty in decreasing order as given; sandy, well drained, and dark colored soils are less liable to frosts than heavy clays and wet, poorly tilled, light colored types.

TO WARD OFF FROST

Since frosts accompany dry, clear, still air and the radiation of heat from the ground and plants, the following methods of preventing

them can be employed in the small garden according to the means at hand: (1) Heating of the air by means of smudge fires, orchard heaters, etc.; (2) the moistening of the air by means of sprays; (3) a combination of (1) and (2), such as the discharge of waste steam into the air; (4) ventilation, or the stirring of the atmosphere, to prevent the settling of layers of cold air on the plants; (5) irrigation by the furrow or flooding system; (6) the covering of tender plants with cloths, paper, or a mulch; (7) the spraying of the plants themselves both to prevent the formation of frost and to help thaw out hardy plants that may have been touched overnight.

FALL TREATMENT OF PLANTS WITH REFERENCE TO FROST

VEGETABLES.—Perennials, such as Asparagus, Horseradish, Jerusalem-artichoke and Strawberries are entirely hardy. It is, however, well to mulch them after the ground freezes, partly to prevent alternate thawing and freezing, which tend to heave them out of the ground, and partly to add plant food to be dug in in the Spring.

Annuals may be put into four groups with relation to their ability to withstand frost, as follows:

1. Entirely hardy. Those marked *a* may be sown or planted in late Fall for early Spring use. The rest may be left in the garden to be harvested as needed. For convenience, it is well to mulch the root crops to make digging easier: Broccoli, Brussels Sprouts, Cornsalad (*a*), Kale, Leek, Parsnips, Salsify, Witloof Chicory (*a*), Spinach (may be handled both ways).

2. *Hardy*. These will stand a light freeze but should be harvested before the ground freezes solid. In the case of frosted Lettuce, thaw out slowly in ice water and use at once. Carrots, Lettuce, Onions, Peas, Rutabagas.

3. *Fairly hardy*. These will stand a light frost and do their best in cool weather: Beets, Cabbage, Cardoon, Cauliflower, Celery, Celery Cabbage (Pe-tsai), Kohlrabi, Potatoes, Radishes, Swiss Chard.

4. Practically all other vegetables need warm weather in which to make good growth, and protection from even the lightest frost.

FLOWERS. Perennials are, of course, hardy as to root, even though their tops may be killed down. The following, however, continue to bloom well after the first frost: Chrysanthemum, Gailardia, Antirrhinum, Coreopsis, Lathyrus.

Perennials growing from bulbs that are hardy and that therefore can be planted in the Fall for Spring blooming, include: Lilies,

Crown-imperial, Hyacinth, Lily-of-the-valley, Narcissus, Scilla, Tulips.

Plants with tender bulbs which should be dug after frost has killed or blackened the tops but before the ground freezes, include the following: Tuberous Begonia, Caladium, Calla, Dahlia, Gladiolus, Torchlily, Tuberose.

Of non-bulbous annuals which are not expected to last more than one season, there are some that continue to bloom even after a mild frost. Among these are: China-aster, Cosmos, Sweet Alyssum, Clarkia, Marigold, Pansy and Stocks.



Chapter XXIX

SOME INSECT PESTS OF CULTIVATED PLANTS

By W. E. BRITTON

State Entomologist, Agricultural Experiment Station, New Haven, Conn.

The Life of an Insect—Spraying Equipment—Materials Used to Control Insect Pests—Fumigants—General Recommendations—Insect Pests Arranged by Host Plants

THERE is scarcely a crop grown which is not attacked and injured by insects. It has been estimated that at least one-tenth of all crops in the United States is destroyed each year by insects. This total damage amounts to fully \$1,000,000,000 annually.

This article has been prepared so that the amateur may have a simple guide at hand for convenient reference. A part of the material and illustrations has appeared in the Plant Pest Handbook published by the Connecticut Agricultural Experiment Station, and is here printed, by permission, in somewhat different form.

THE LIFE OF AN INSECT

Insects are very abundant and occur everywhere. Though some are called injurious because they attack and injure or destroy plants or plant materials, or infest animals which man has raised for his own use, there are many beneficial insects: some furnish food, like the honey bee, some provide clothing material, like the silkworm, many are parasites upon noxious insects, and many species of bees pollinate the flowers of fruit and garden trees and plants, thus assuring a crop. Most insects have the following four distinct stages in their cycle of development:

- | | |
|--|---------------------|
| 1. Egg | 3. Pupa (chrysalis) |
| 2. Larva (caterpillar, grub, maggot, etc.) | 4. Adult |

In several large groups, including the grasshoppers, true bugs, aphids, scale insects, etc., the insects do not pass through the distinct larval and pupal stages, but undergo a gradual development from the time they hatch from the eggs until the adult stage is reached.

Insects may be divided roughly into *biting* or *chewing* (like the Colorado potato beetle) and *sucking* (like the aphids and scale insects). Against the former we can use arsenical poisons, but to kill the latter we must use contact insecticides. Both may be killed with fumigants. The two forms are illustrated on page 431.

SPRAYING EQUIPMENT

Every one who grows plants should be provided with some convenient form of pump for applying sprays and should keep in stock a few of the materials most often used, so as to be available at a moment's notice when needed.

For the small garden, one of the most convenient pumps is the small compressed air outfit holding from three to four gallons. If a knapsack sprayer or bucket outfit be possessed, either can be made to answer the purpose. For more extensive operations a wheel outfit with tank holding 25 gallons is desirable, especially in the vegetable garden. A barrel pump is essential to obtain sufficient power to spray large fruit trees, and special power outfits are now being used in large orchards, potato fields, and for spraying shade and woodland trees. Nearly all pump manufacturers make outfits corresponding to those mentioned. For under leaf spraying, a pipe, bent at a right angle, with a nozzle near the elbow, is essential.

For dusting, the grower may purchase a power duster or hand duster, according to the amount of work to be done. In the small garden, a shaker may be improvised by punching small holes in a tin can, or by shaking the poison through the meshes of a cheesecloth bag.

Lead Arsenate should be kept on hand, preferably in the dry or powdered form. This may be applied either as a dust or as a spray and keeps in better condition than the paste, which is apt to become frozen or lumpy from drying, or to corrode the container. The dry form may be kept indefinitely. Some standard *nicotine preparation* should also be kept in stock for dilution, to be used against sucking insects.

Most of the other materials herein mentioned may be procured as needed from the local seed or hardware store, or from druggists. In large operations home mixing is usually more satisfactory and economical, but the small grower will often prefer to buy ready prepared insecticides, and he should find them satisfactory if put out by reputable manufacturers, and if he follows directions.

MATERIALS USED TO CONTROL INSECT PESTS

STOMACH POISONS—TO KILL CHEWING INSECTS

LEAD ARSENATE

To be used in the proportion of 3 lbs. paste, or 1 ½ lbs. dry powder lead arsenate.
50 gallons water.
Apply as a spray. The dry powder may also be sifted upon the plants.

COATED LEAD ARSENATE

A lead arsenate processed with lead oleate in such manner that each particle of poison is covered with lead oleate.

MAGNESIUM ARSENATE

3 lbs. dry powder, 2 lbs. Casein-lime, 100 gallons water. For Mexican bean beetle. May be used as a dust, 1 lb. of poison mixed with 5 lbs. hydrated lime.

BARIUM FLUOSILICATE

1 lb. mixed with 5 lbs. hydrated lime. Used as a dust for Mexican bean beetle.

HELLEBORE

A vegetable powder to be sifted upon the plants or to be mixed with water, 1 ounce in 2 gallons, and applied as a spray. Hellebore loses its value on long standing. Hence fresh stock should always be purchased from the wholesale druggist, and it should be kept in a tightly stoppered container.

POISONED BRAN MASH

Wheat bran.....5 lbs.
Paris green or white arsenic.....4 ozs.
Lemon or orange.....1 fruit
Molasses.....1 pint
Water.....7 pints

Mix bran and poison together, dry. Squeeze juice of lemon into water and then cut pulp and peel into fine pieces and add to water, then add molasses and stir. Add syrup to bran and mix thoroughly. To kill cutworms, the mash should be scattered over the field just before dark, preferably a few days before the plants are set. Also effective in killing grasshoppers.

CONTACT INSECTICIDES—TO KILL SUCKING INSECTS

COMMERCIAL LIME SULPHUR

1 part lime-sulphur } For dormant or Winter spray to kill San José
9 parts water } scale.
May be diluted 1-40, to be used as a Summer spray to control red spider or fungi.

NICOTINE SOLUTION

½ pint (40 per cent nicotine sulphate).
50 gallons water or 1 teaspoonful in a gallon.
2 pounds common soap.
May be added to any of the other sprays mentioned herein by omitting the soap.

PYRETHRUM SOAP

Several soaps are now sold containing extract of pyrethrum, such as "Red Arrow" and "Evergreen." Follow directions on package.

COMMON SOAP AND WATER

1 pound common laundry soap.
8 gallons water.

MISCIBLE OIL

1 part miscible oil } For dormant or Winter spray
15 parts water }

LINSEED OIL EMULSION

1 gallon raw linseed oil } For red spider and other mites.
1 ½ pounds soap flakes }
1 gallon water }
Dissolve flakes in water; stir in the linseed oil and dilute to make 100 gallons.

WHITE OIL EMULSIONS

Certain proprietary oil sprays such as "Volck" and "Verdol" are useful as Summer sprays to kill scales and mites on ornamental plants. Follow directions on package.

GLUE SOLUTION

1 pound powdered glue in 10 gallons water. Useful to control mites on conifers.

FUMIGANTS

CARBON DISULPHIDE (Bisulphide). This is an ill-smelling, inflammable liquid which can be purchased in pound bottles. It volatilizes readily at warm room temperatures, and is especially valuable for fumigating stored seeds which are infested by weevils or other insects. The liquid should be placed in a shallow dish on top of the seeds, and the receptacle should be covered tightly and allowed to remain from 24 to 36 hours; two fluid ounces are sufficient for the ordinary flour barrel or its equivalent. In fumigating rooms and buildings, about 10 pounds are required for each 1000 cubic feet of space.

HYDROCYANIC ACID GAS. *Caution: This gas is deadly to all kinds of animal and human life and should be used with great care.* It may be prepared from the materials and in the proportions given below:

Sodium cyanide.....1 oz. (avoirdupois)
Sulphuric acid (commercial).....2 ozs. (fluid)
Water.....4 ozs. (fluid)

This quantity is adequate for each 100 cubic feet of space for use on dormant nursery stock, dry seeds, buildings, etc.

For greenhouses, coldframes and hotbeds containing growing plants, use one-half ounce of cyanide with proportionate amounts of acid and water for each 1000 cubic feet of space.

The cubic contents of the space to be fumigated should first be computed carefully, the space should then be made as tight as possible, leaving doors, windows, or other openings which can be manipulated from the outside for the purpose of airing.

Stoneware crocks or earthenware jars may be used as generators, and should be so placed as to give the best possible distribution of the gas. The proportionate quantity of acid and water should be measured for each, and the cyanide weighed and placed in paper or cheesecloth bags. The water should be placed in the jar and the acid poured in carefully with constant stirring. When all is ready, quickly drop each bag into its jar, retire promptly, and lock the door. For greenhouses the exposure should be for 30 minutes, preferably toward night, or when the sun does not shine and when the plants are dry. For dormant nursery stock, 30 minutes. Buildings, granaries, etc., may remain closed over night. Open two or more openings from the outside and wait for 30 minutes before going inside. Then quickly open all sources of ventilation without breathing the gas.

EQUIVALENT WEIGHTS AND MEASURES

3 teaspoons = 1 tablespoon
2 tablespoons = 1 fluid oz.
16 fluid ozs. = 1 pint
8 pints = 1 gallon

GENERAL RECOMMENDATIONS

Where possible, practice rotation, and do not grow the same crops on any piece of ground year after year. Always remove or destroy all tops, rubbish, etc., which may harbor insects. Give the plants clean culture and allow no weeds in the garden.

If pests appear which you cannot identify, write and send specimens to your State Agricultural Experiment Station for information and advice.

INSECT PESTS—ARRANGED BY HOST PLANTS

APPLE



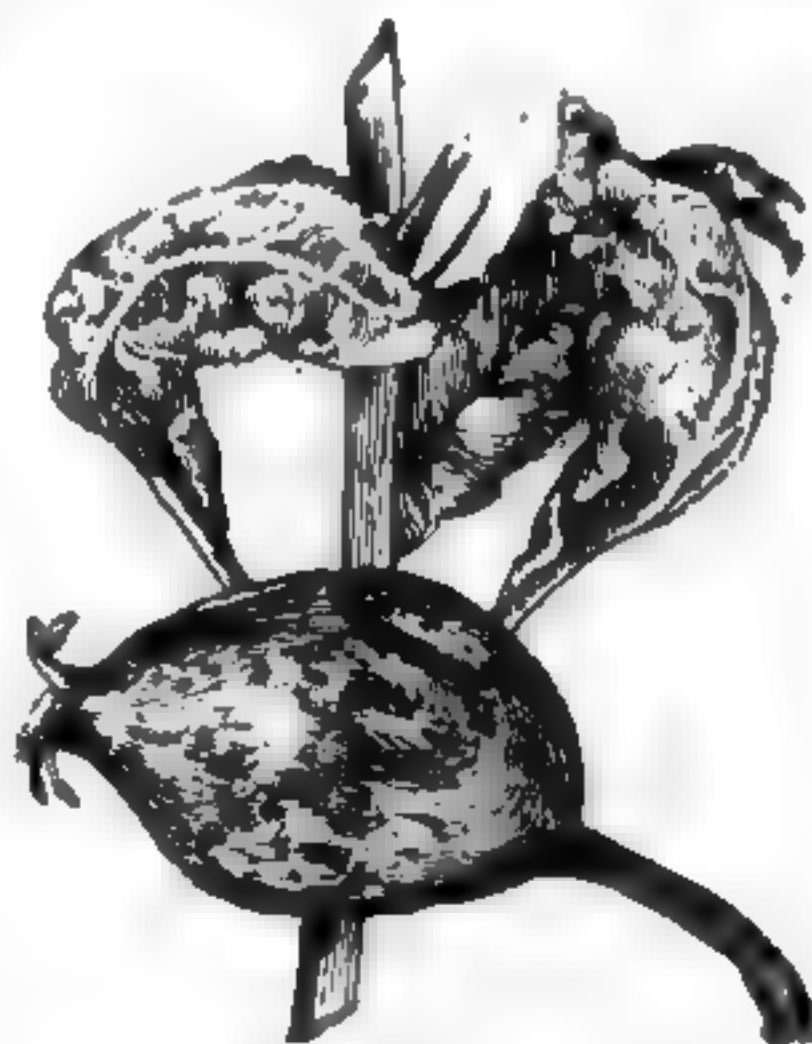
Green Apple Aphids

Aphids: Rosy aphids attack the fruit clusters which fail to develop, and also the leaves, causing them to curl. The green aphids usually attack only the leaves of terminal shoots and water sprouts, causing them to curl, thus checking the growth. Spray with nicotine solution as for red bugs.

Apple and Thorn Skeletonizer: Small spotted larvae feed under a web

and skeletonize the upper surface of the leaves. White pointed cocoons are fastened to the leaves. Purplish moths rest on flowers and window screens; three broods each season. Spray with lead arsenate.

Apple Maggot or Railroad Worm: Small, legless white maggots burrow in the flesh of the ripening fruit of sweet and sub-acid varieties, especially those ripening early in the season. Will greatly injure fruit in storage unless kept at a low temperature. Spray with lead arsenate about July 5 and 20. Destroy all infested fruit.



Apple Red Bugs



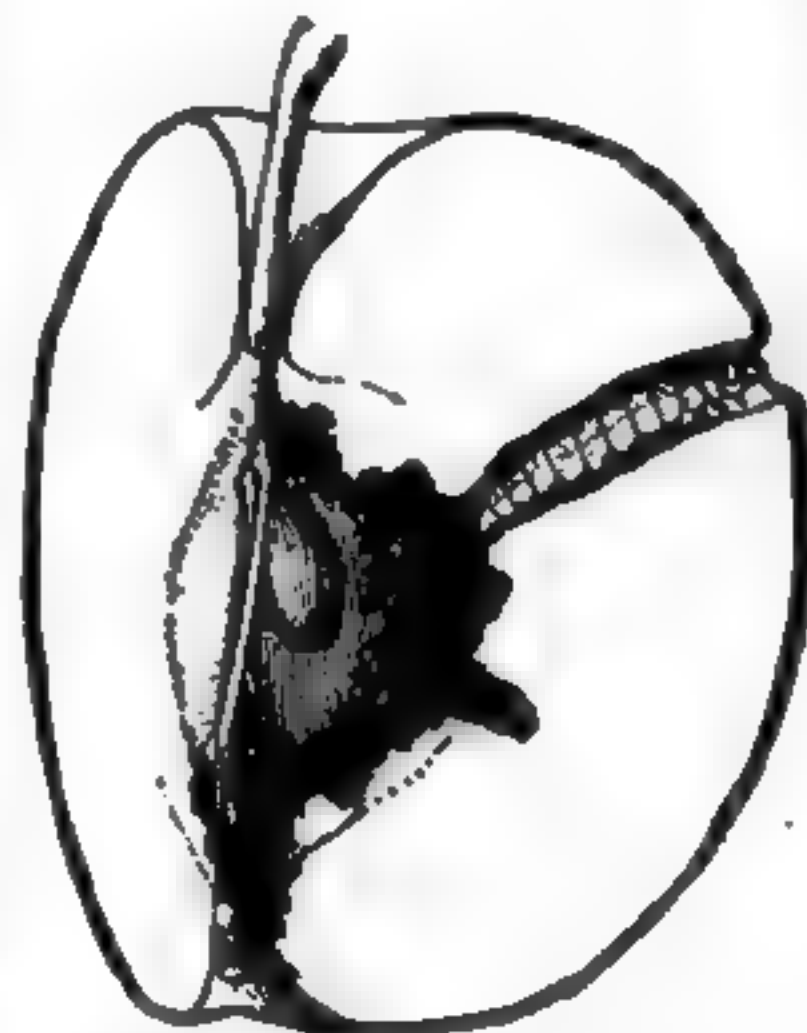
Canker Worms

leaves to become distorted, and the fruit to be irregular with depressed spots usually most abundant near blossom end. Spray with nicotine solution (1 pint in 50 gallons water) either separately or in combination with lead arsenate, lime-sulphur or Bordeaux mixture.

Canker Worms: Small looping caterpillars feed upon the leaves during May, and when dis-

turbed spin down on silken threads. Spray foliage with lead arsenate before blossom buds open, and again soon after the petals fall. In unsprayed orchards sticky bands of tree tanglefoot should be placed around the trees late in October, and kept sticky until January 1, and again kept sticky from April 1 to June 1.

Codling Moth or Apple Worm: Larva burrows inside the fruit, particularly around the core. Spray with lead arsenate soon after blossoms fall and repeat three to four weeks later. Both foliage and fruit should be kept well covered with

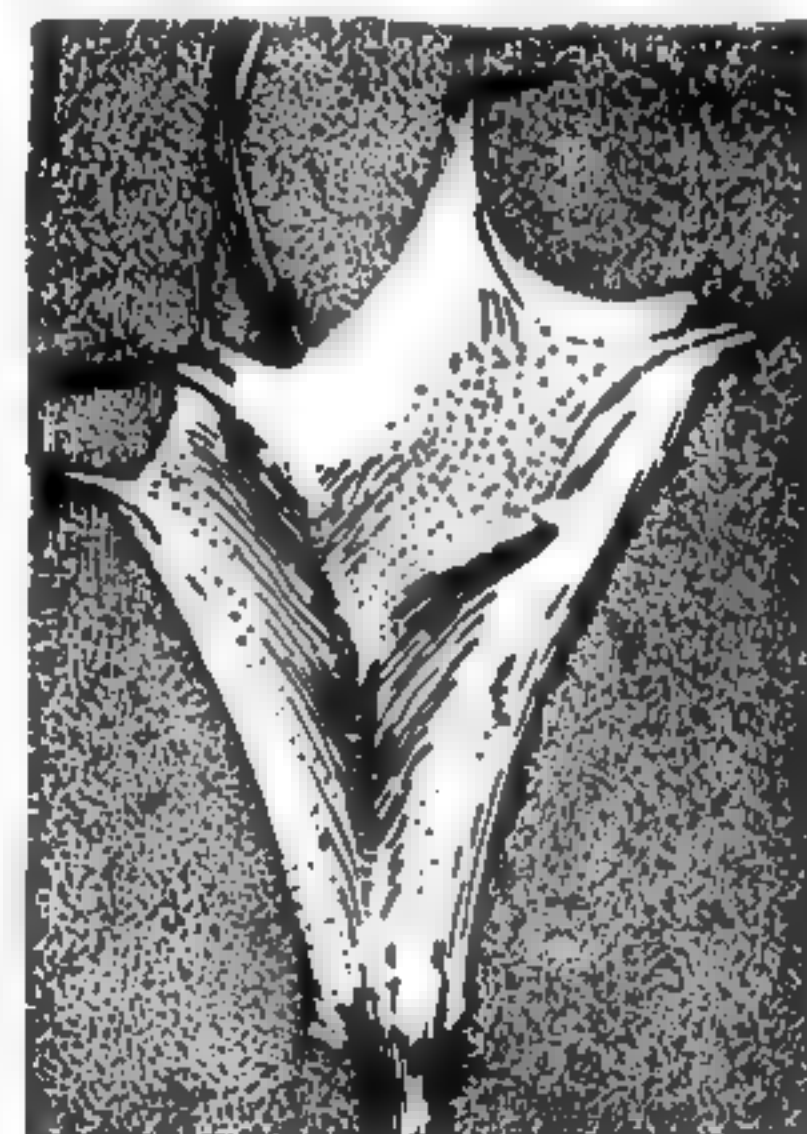


Codling Moth or Apple Worm

spray until fruit is nearly grown.

Curculios: Grubs of both Apple and Plum curculios infest the fruit, making it gnarled and ill-shaped. Spray twice after blossoms fall, and remove infested fruit in thinning.

Eastern Tent Caterpillar: Forms nests at the forks of the branches during the month of May and the caterpillars devour the leaves. Spray with lead ar-

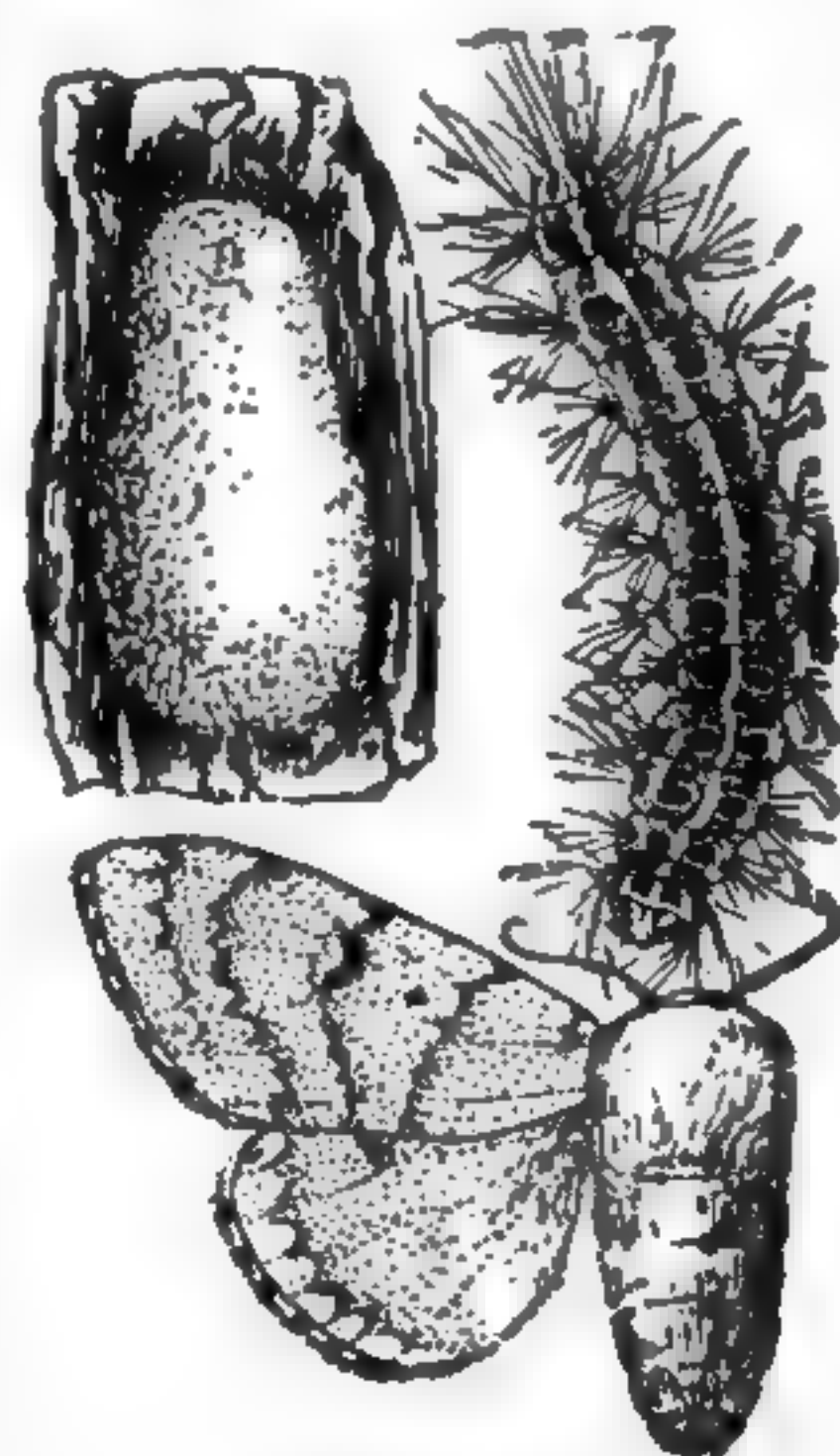


Tent Caterpillar

senate just before blossoms open and again after they fall. Egg masses may be clipped off and burned during Winter, and the nests may be removed with a cone-shaped brush.

Fall Webworm; Brown-tail Moth: See Pear.

Gipsy Moth: Occurs in the United States only in the New England States. Brownish, hairy caterpillars defoliate the trees in May and June.



Gipsy Moth

Spray foliage with lead arsenate, using 3 pounds of the dry powder in 50 gallons of water. From August to May, seek for egg clusters and destroy them *in situ* by soaking with creosote. Band trees with tree tanglefoot.

Japanese Beetle: See Rose.

Leaf Blister Mite: See Pear.

Leaf-crumpler; Case Bearers; Bud Moths: Several kinds pass the Winter as small caterpillars and feed upon the unfolding leaves, occasionally doing considerable damage. Spray with lead arsenate as soon as trees begin to look green; repeat a week later.

Leaf Hoppers: Whitish insects suck sap from the underside of the leaves, causing a whitish spotting or mottling on upper surface. Spray with nicotine solution as for red bugs.

Leaf Roller; Green Fruit Worms; Palmer Worm: Caterpillars feed upon leaves and partly grown fruit, often seriously injuring it. Spray with lead arsenate as for codling moth.

Leopard Moth: See Elm.

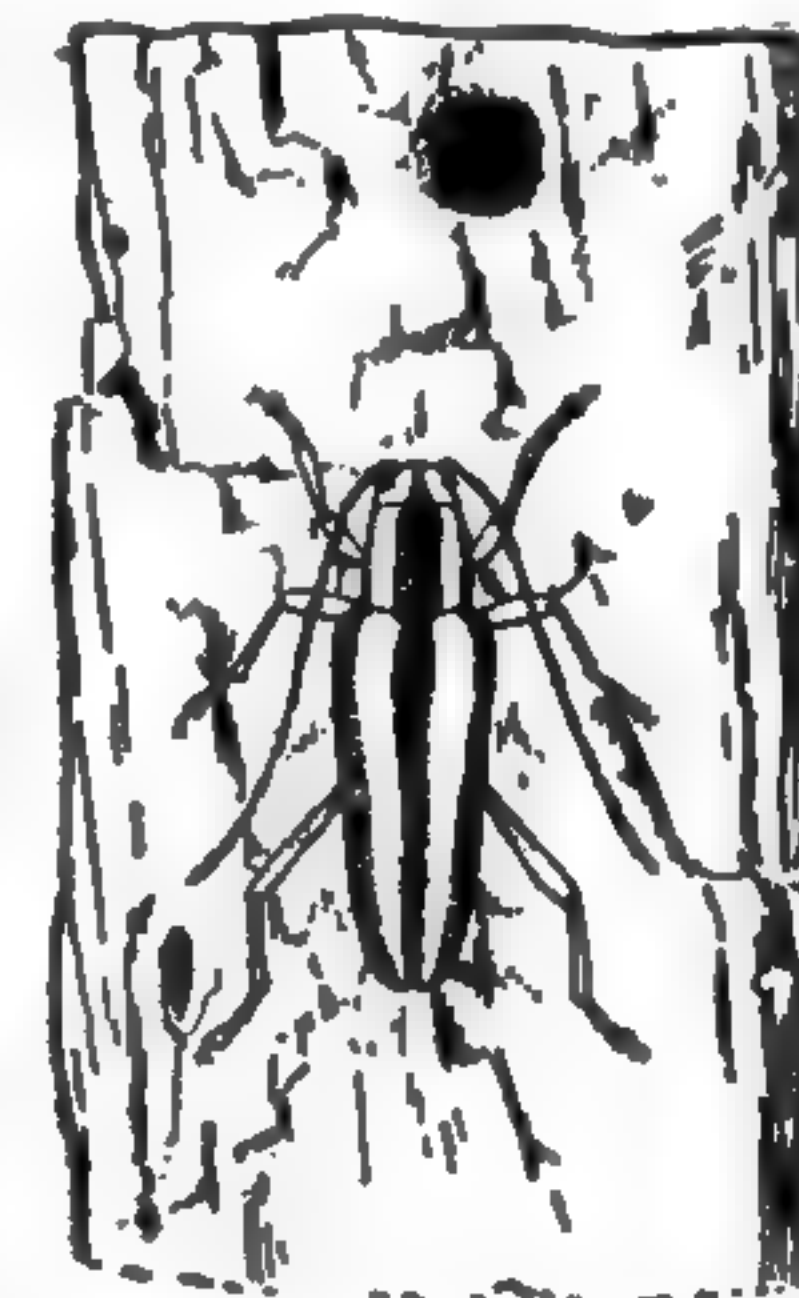
Lesser Apple Worm: Feeds on the surface of fruit that is nearly mature, often injuring it in storage. Spray as for codling moth.

Oyster-shell Scale;

Scurfy Scale: Both occur on the bark and are elongated or pear-shaped shells, the former about the same color as the bark, the latter, light gray or whitish. The insect under the shell sucks sap from the twigs. Spray with nicotine solution, soap and water, or kerosene emulsion about the second week in June.

Red-humped Caterpillar; Yellow-necked Caterpillar: Feed in clusters on ends of branches, often stripping young trees in August and September. Gather by hand and destroy, or spray the foliage with lead arsenate.

Red Spider; European Red Mite; Clover Mite: Injures the leaves, especially in dry seasons, by feeding on the surface, causing them to turn yellow or rusty in color. Eggs of clover mite and European red mite are often abundant on tree trunks through the Winter and are orange red in color; they are killed by a dormant spray of miscible oil (1-15). For Summer treatment spray leaves with lime-sulphur (1-40).



Round-headed Borer



Oyster-shell Scale

Round-headed Borer; Flat-headed Borer: Grubs tunnel in the trunk near the ground. Dig out the borers wherever sawdust appears. Apply a mixture of lime-sulphur and lead arsenate to the trunks.

San José Scale: See Pear.

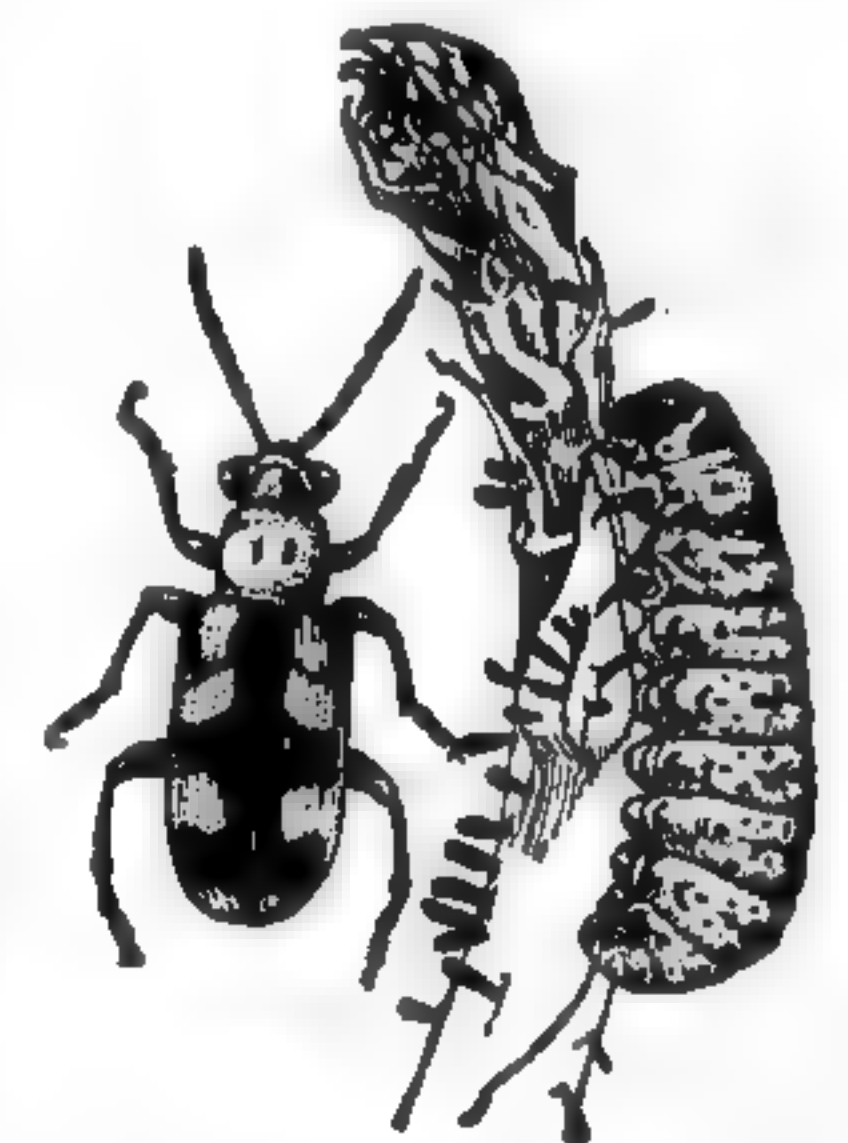
Tarnished Plant Bugs: Suck the sap from the fruit, dimples developing from the punctures. Spray with nicotine solution as for red bugs.

Tussock Moths: Tufted caterpillars of several species feed upon the leaves the latter half of Summer. The white-marked tussock moth and the hickory tussock moth are usually the most abundant and therefore the chief offenders. Spray with lead arsenate as for codling moth.

Woolly Apple Aphids: A white, woolly or cottony mass on bark represents a colony of this aphid, which sucks the sap, forming swellings or galls on the twigs. It clusters in wounds and prevents healing. It also forms galls on the roots, and often the smaller roots decay. Plant only clean or fumigated stock. Apply tobacco dust liberally and work into the soil around trees. Spray with kerosene emulsion or with nicotine solution to kill aphids on twigs.

ASPARAGUS

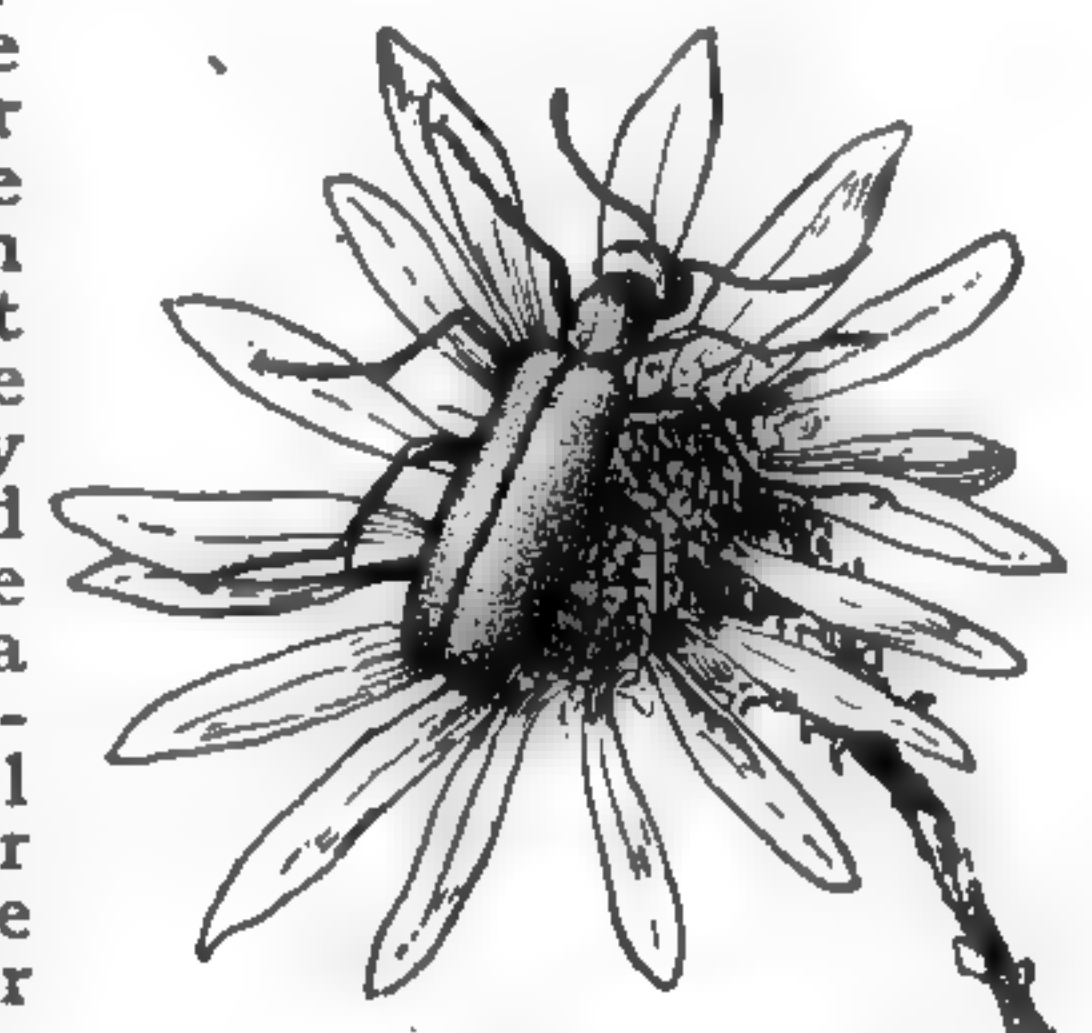
Asparagus Beetles: Both adults and larvae of the common Asparagus beetle, and the twelve-spotted Asparagus beetle feed upon the leaves, often injuring new plantations. Cut everything clean during the cutting season; later spray with lead arsenate. New plantations should be sprayed when the beetles first appear.



Common Asparagus Beetle

ASTER

Blister Beetles: The black blister beetle is the most common species. It feeds upon the flowers. Daily hunting and shaking the beetles into a pan of kerosene will quickly clear them. Some cover after that with mosquito netting.

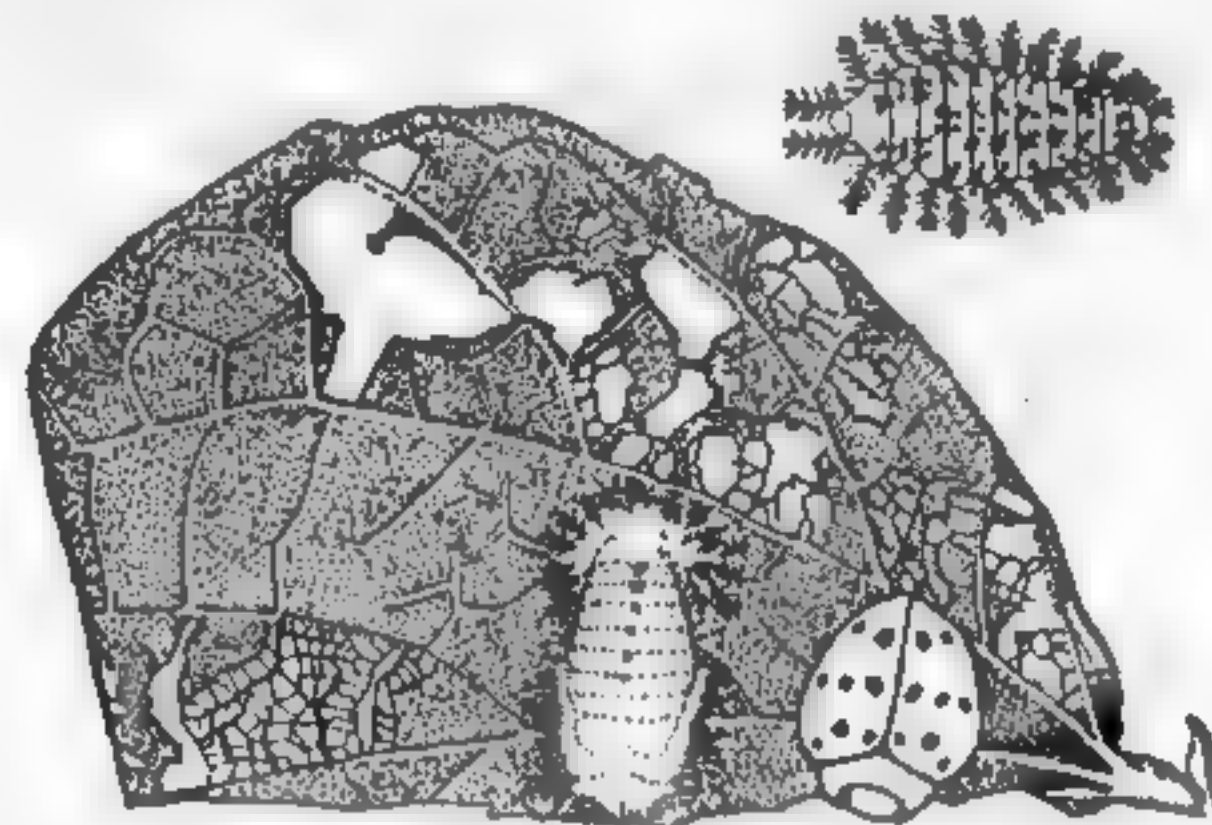


Black Blister Beetle

BEAN

Bean Aphid: Black aphids on leaves and new shoots suck the sap. Spray with nicotine solution.

Green Clover Worm: Occasionally slender, green, wriggling caterpillars riddle the leaves in July. Dust string beans with nicotine dust or spray with pyrethrum soap. Beans to be shelled may be sprayed with magnesium arsenate.



Mexican Bean Beetle

Mexican Bean Beetle: Adults and larvae feed on the leaves. Adult lays yellow eggs on under side. Larva is yellow with black spines and feeds on under surface. Pupa is fastened to a leaf. There are two broods each season. Spray or dust under surface with magnesium arsenate or barium fluosilicate. String beans in the home garden may be sprayed with pyrethrum soap.

Weevil: Adults lay eggs in the pods in the field and keep on breeding in the dried seed, finally ruining it for planting or for food. Fumigating for 36 hours with carbon disulphide, using about two fluid ounces in a shallow dish on top of the seed in a tightly covered barrel will kill the weevils without injuring the beans for food or for planting. Mixing the beans with an equal weight of air-slaked lime will prevent damage. If to be used for food only, the beans may be heated in the oven to kill weevils, but if the temperature approaches 150 deg. F. the vitality of the seeds is endangered.



Bean Weevil



Garden Springtail

BEET; SWISS CHARD

Blister Beetles: Spray with pyrethrum soap. See Aster.

European Corn Borer: Sometimes tunnels in leaf stems. See Corn.

Garden Springtail: Tiny dark purplish jumping insects devour young seedlings. Spray with nicotine or pyrethrum soap.

Spinach Leaf Miner: See Spinach.

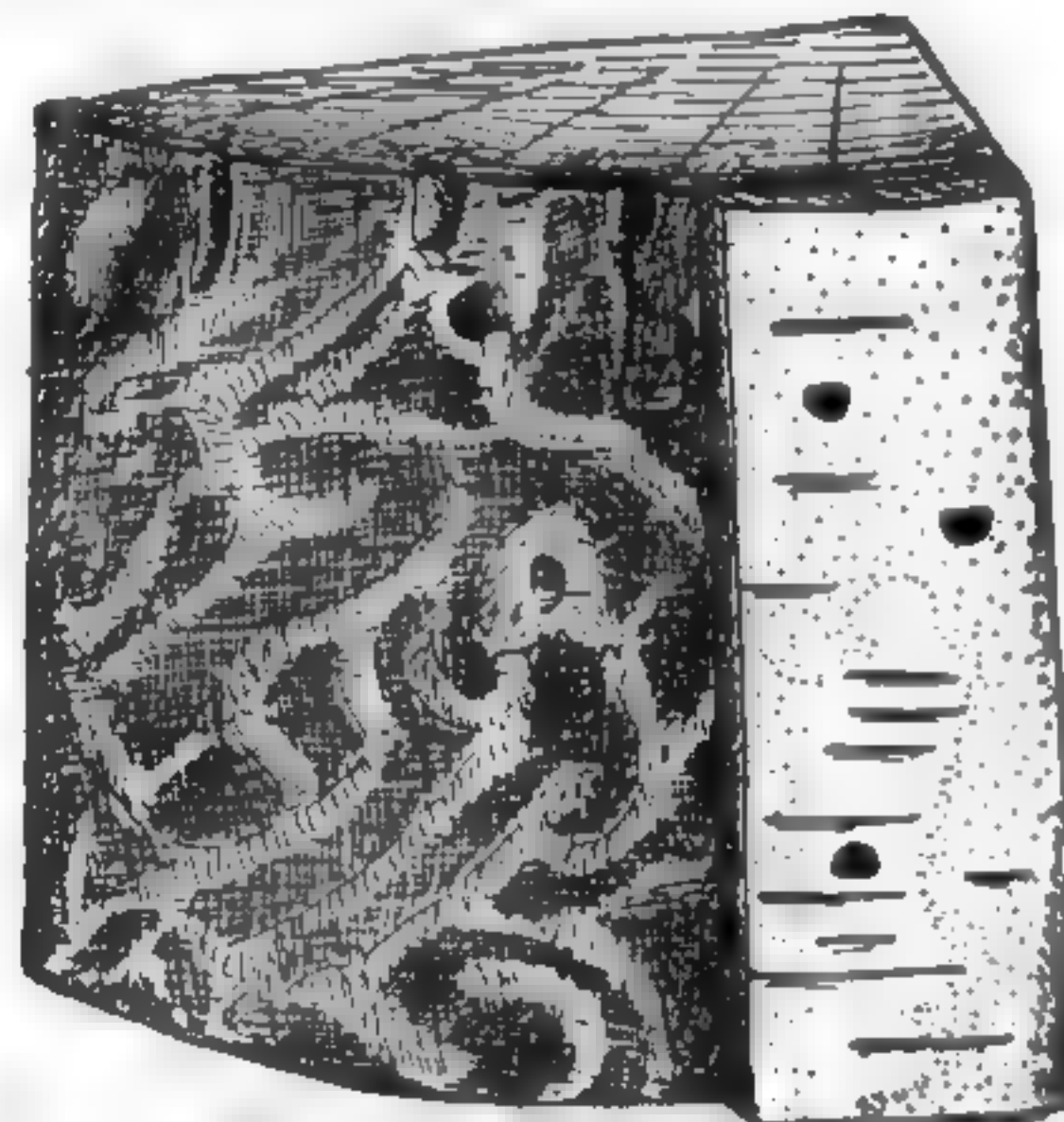
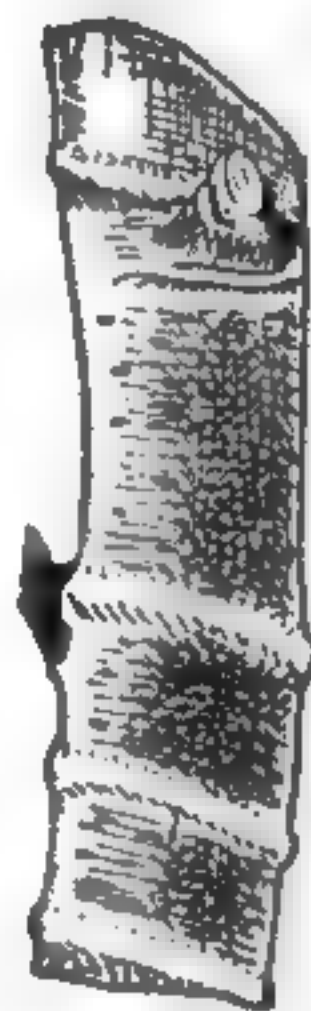
BEGONIA

Aphids: Several species of aphids occasionally infest Begonia. Spray with nicotine.

Mealybugs: Sometimes injure Begonia. Spray with nicotine or pyrethrum soap.

BIRCH

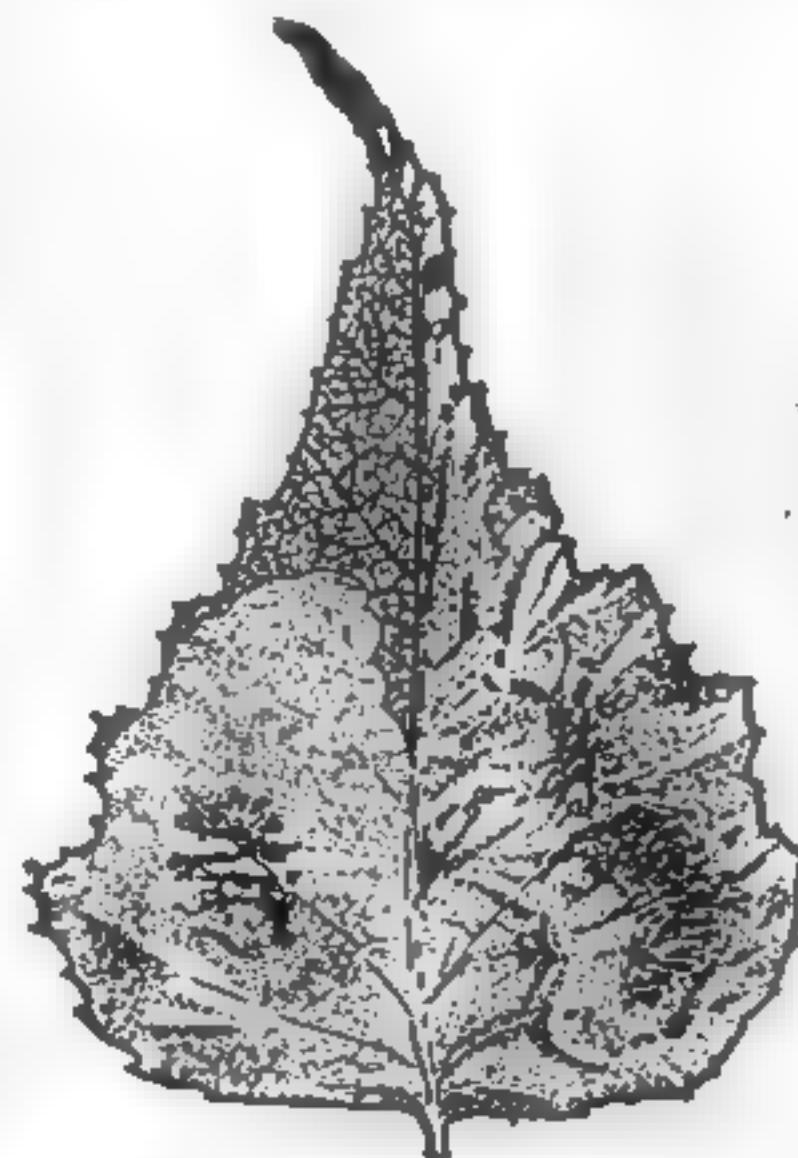
Birch Leaf Skeletonizer: Small yellowish larvae feed on both sides of the leaves in late Summer, often stripping the trees. Spray in July with lead arsenate.



Work of Bronze Birch Borer

Bronze Birch Borer: The grub makes a spiral tunnel just under the bark of upper main branches, ridges showing on the outside. Often kills trees. Cut and burn badly infested trees before May 1. Spray foliage with lead arsenate late in May; feed and water the trees to induce vigorous growth.

Imported Birch Leaf Miner: Sawfly larvae mine the terminal leaves of gray and paper Birch, causing them to turn brown. There are three broods annually and two sprays of nicotine sulphate (1-800) about a week apart the last of May for the first brood, and three similar treatments beginning about July 3 for the second brood, will give partial control.



Work of Imported Birch Leaf Miner

Tussock Moths: See Apple, Hickory and Horsechestnut.

BLACKBERRY

Blackberry Crown Borer: Grub tunnels in larger roots and at base of stem. No remedy except to dig out and destroy.

Blackberry Sawfly: Larvae feed upon leaves in June and July. Spray with lead arsenate about June 15.

Red-necked Cane Borer: Grub tunnels in stalks, forming galls or swellings often 3 in. long. Cut and burn all infested canes in Winter or early Spring.

BOX

Leaf Miner: A small two-winged fly lays eggs in the leaf and the larvae tunnel between the upper and lower surfaces. Destroy infested leaves. Spray underside of leaves with molasses, one part in four parts water, with nicotine sulphate added (1-500) at time adult flies begin to emerge, and repeat in order to keep the leaves sticky for three weeks.

Oyster-shell Scale: See Apple.

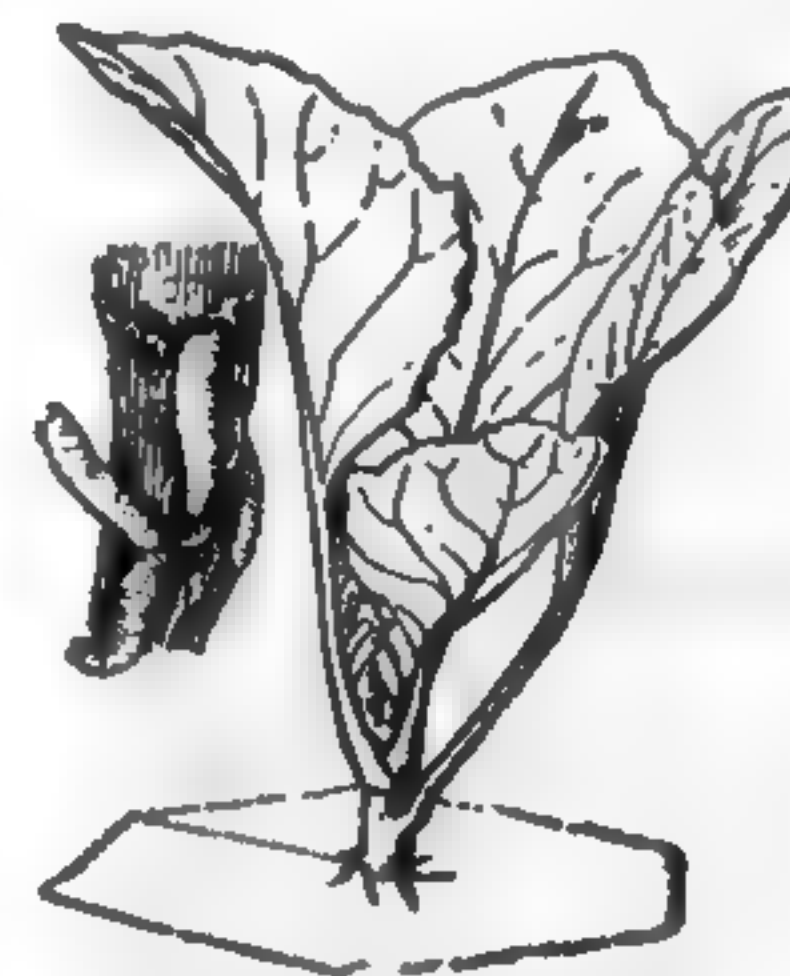
CABBAGE; CAULIFLOWER

Cabbage Aphid: Clustered underneath the leaves, this insect sucks the sap, often causing much injury. Underspray or dust heavily with nicotine dust.

Cabbage Looper: Smooth looping caterpillar feeds with cabbage worm in the late Summer and often tunnels into the cabbage head. Spray with pyrethrum soap.



Cabbage Looper



Cabbage Maggot

after plants are set. Practice crop rotation.

Cabbage Maggot: Tunnels in stem and main root of early set plants, near surface of ground, checking growth and often killing the plants. Place tarred paper discs around stems or apply a 4 per cent Calomel gypsum dust or half a cupful of liquid Calomel (1 ounce in 10 gallons water) Practice crop rota-

Cabbage Worm:

Velvety green worms feed on leaves throughout the season. Spray unheaded plants with lead arsenate. Use insect powder, Hellebore or pyrethrum soap on headed plants.

Diamond-back Moth: Tiny pale green larvae occasionally injure Cabbage by eating round holes in the leaves. Spray with lead arsenate.

Zebra Caterpillar: Black caterpillars with narrow, bright yellow markings sometimes feed upon Cabbage and many other plants. Spray with lead arsenate.



Cabbage Worm

CARNATION

Aphid or Green Fly: Sucks the sap from stems, leaves and buds. Spray with nicotine solution, soap and water, or fumigate with tobacco.

Variegated Cutworm: This cutworm often enters greenhouses in the Fall, and at night climbs the stems and eats holes in the buds. Trapping the caterpillars under pieces of board and the use of poisoned bait are recommended.

CELERY

Celery Caterpillar: Devours the leaves of Celery, Fennel, Parsnip, Parsley, and Carrot. Hand picking is usually the best remedy. Parsnip and Carrot may be sprayed with lead arsenate.

Celery or Greenhouse Leaf Tier: Small greenish-white caterpillars striped lengthwise with narrow green stripes, often injure Celery and many other plants. There is no satisfactory means of control.



Celery Caterpillar

CHERRY

Canker Worms: See Apple.

Cherry Aphid: A brown aphid on underside of leaves, sucks the sap and curls the leaves. Spray with nicotine solution and soap.

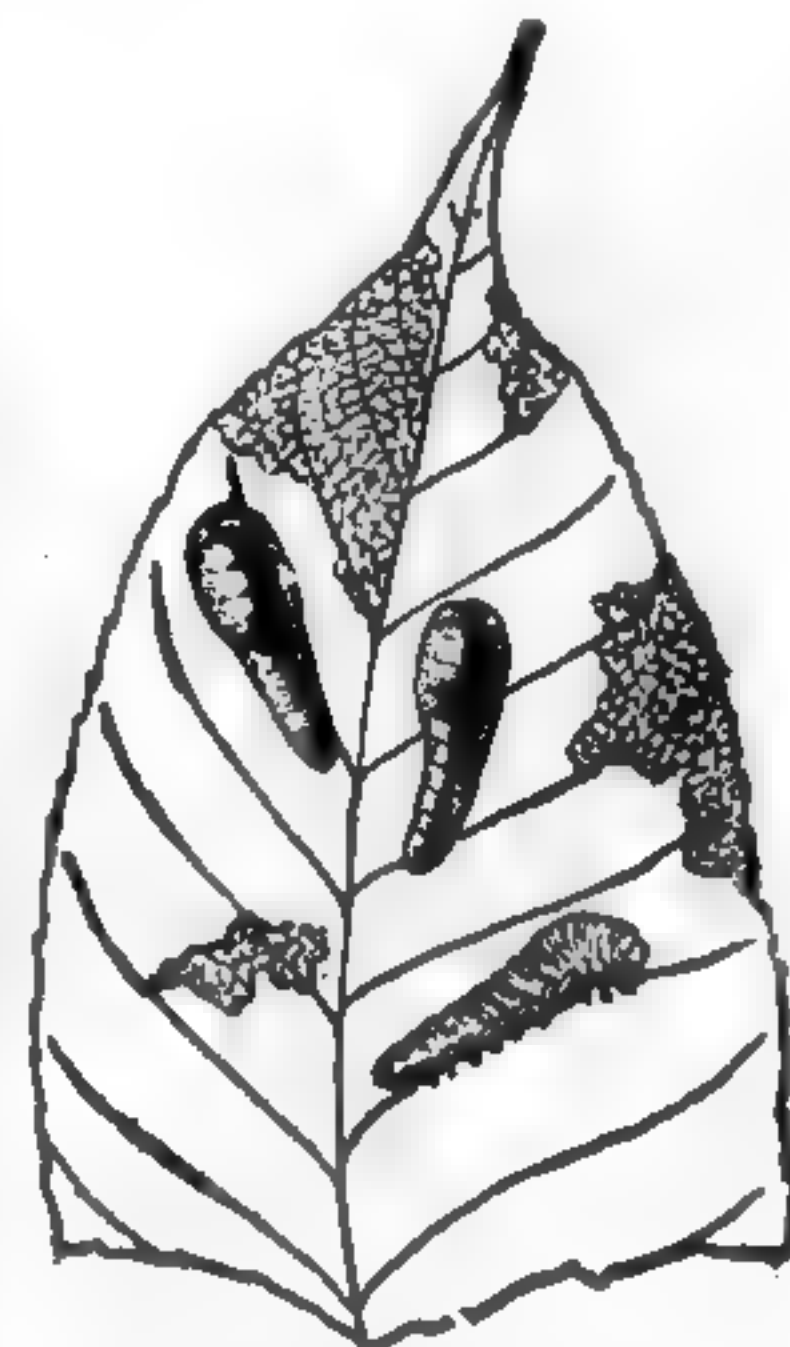
Cherry Maggots or Fruit Flies: Larvae of two species infest ripening fruit. Sprinkle foliage in early June with sweetened lead arsenate to kill the adults.

Cherry or Pear Slug: Eats on upper surface of leaf. Spray with Hellebore or lead arsenate.

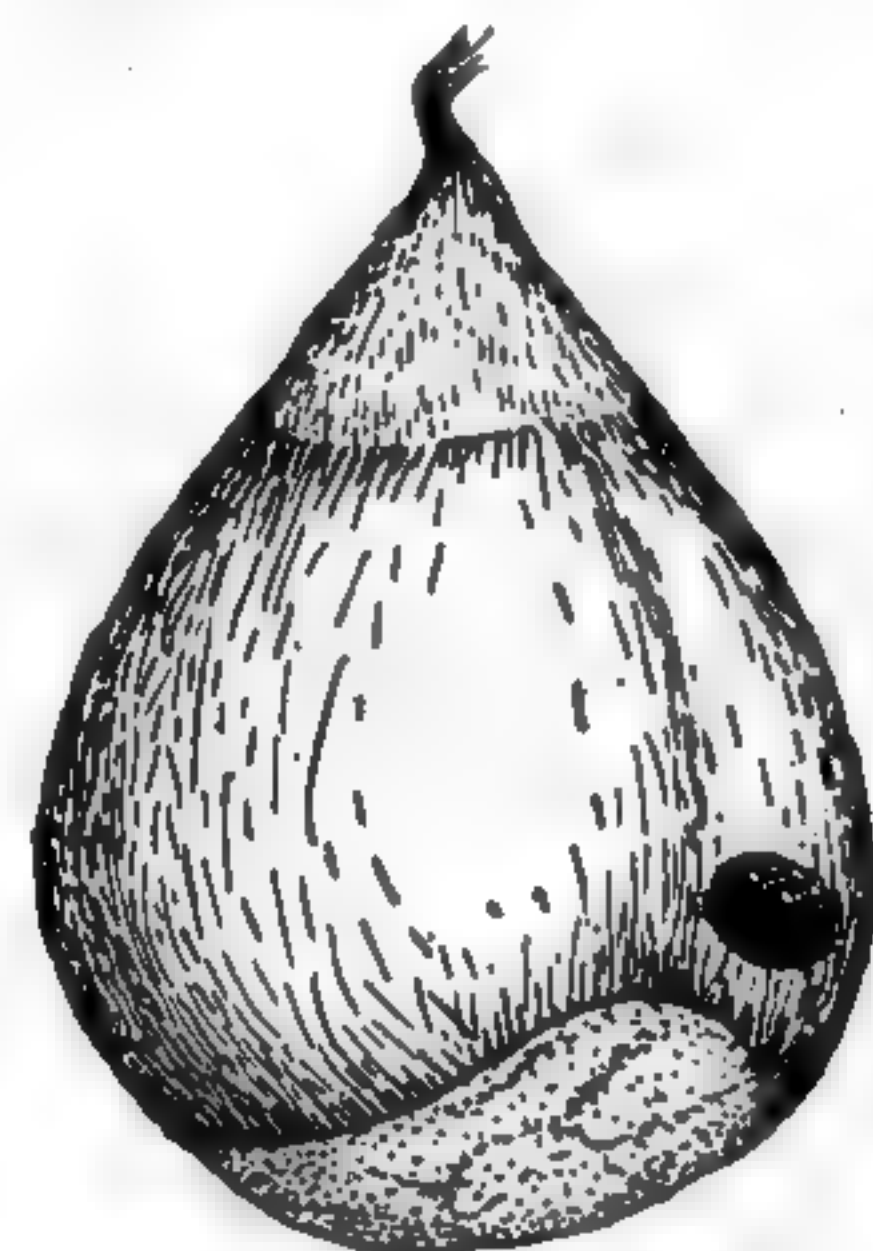
CHESTNUT—CHINQUAPIN

Canker Worms: See Apple.

Nut Weevils: Long-nosed snout beetles lay eggs in developing fruit and the grubs infest the nuts. Destroy all infested nuts. Fumigate nuts with carbon disulphide as for beans.



Cherry or Pear Slug



Weeviled Chestnut

Two-lined Chestnut Borer: Slender, flat-headed grubs tunnel under bark of Chestnut and Oak trees. Badly infested trees should be burned, or the bark removed before insects mature and spread to other trees.

CHRYSANTHEMUM

Aphis or Black Fly: Sucks the sap from the tender leaves and flower stems. Spray

plants with, or dip them in, nicotine solution or soap and water. Fumigate with tobacco. A steady stream of water from your hose will often prove effective.

Chrysanthemum Gall Midge: Larvae form cone-shaped galls on leaves and tender shoots. Spray with nicotine solution and soap, three times weekly.

Cyclamen Mite: See Cyclamen and Larkspur.

European Corn Borer: See Corn.

CINERARIA

Aphis or Green Fly: Sucks sap from new leaves and stems. Spray with nicotine solution or pyrethrum soap.

COLEUS

Mealybugs: Often infest Coleus plants. Spray with nicotine or pyrethrum soap.

COLUMBINE

Columbine Leaf Miner: A two-winged fly lays eggs on the leaves and the maggots tunnel between the upper and lower surfaces. Destroy the leaves first infested and cultivate

the ground around the plants. Spray with nicotine as soon as the mines are noticed.

Stalk Borer: See Dahlia.

CORN

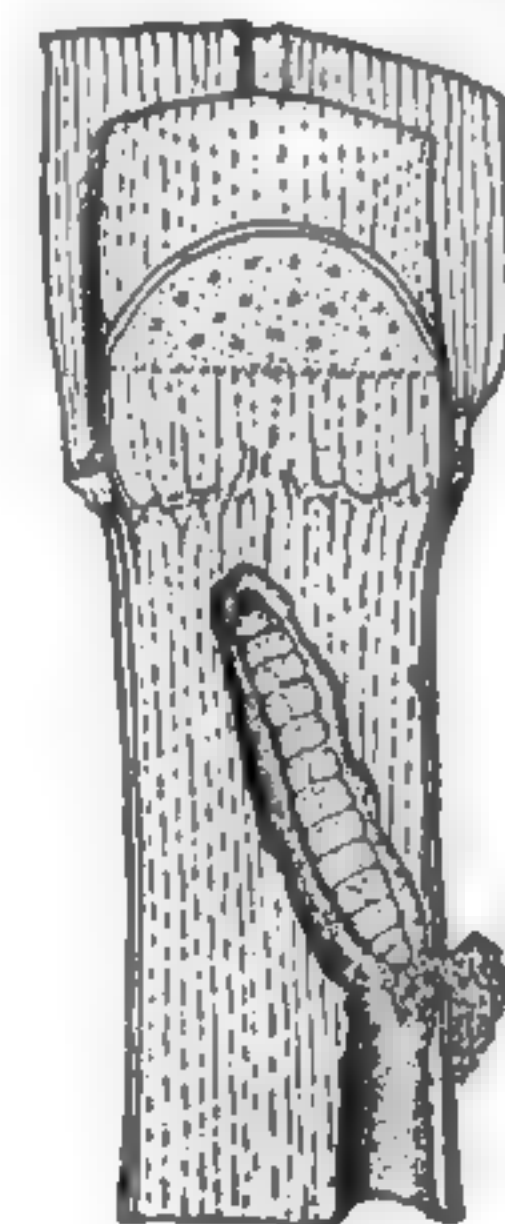
Army Worm: See Grass.

Corn Ear Worm: Eats the immature kernels at tip of ear. Dust the silk with sulphur and powdered lead arsenate, equal parts.

Corn Root Webworm: The larvae of this insect occasionally injure Corn, especially on sod land, by eating into the base of the stalk near the ground. There is no good remedy except to avoid sod land for Corn.

Cutworm: See Tomato.

European Corn Borer: Larvae tunnel in all parts of plant above ground, and also infest Celery, Beans, Beet tops, Chrysanthemum, Gladiolus, Dahlia and the larger weeds. They hibernate in the dry stalks. Burn all infested plants before May 1.



European Corn Borer

Seed Corn Maggot: The maggots of this fly infest the kernels of Corn, Beans and other seeds after planting, and destroy them or injure them so that they do not produce strong plants. The damage is greatest in cold, wet weather, and replanting is the only way to obtain good results.

White Grubs: Occasionally eat off the roots, particularly in sod land. See Grass.

Wireworms: The larvae of click beetles often injure Corn and other plants by drilling into the base of the stem underground. See Tobacco.

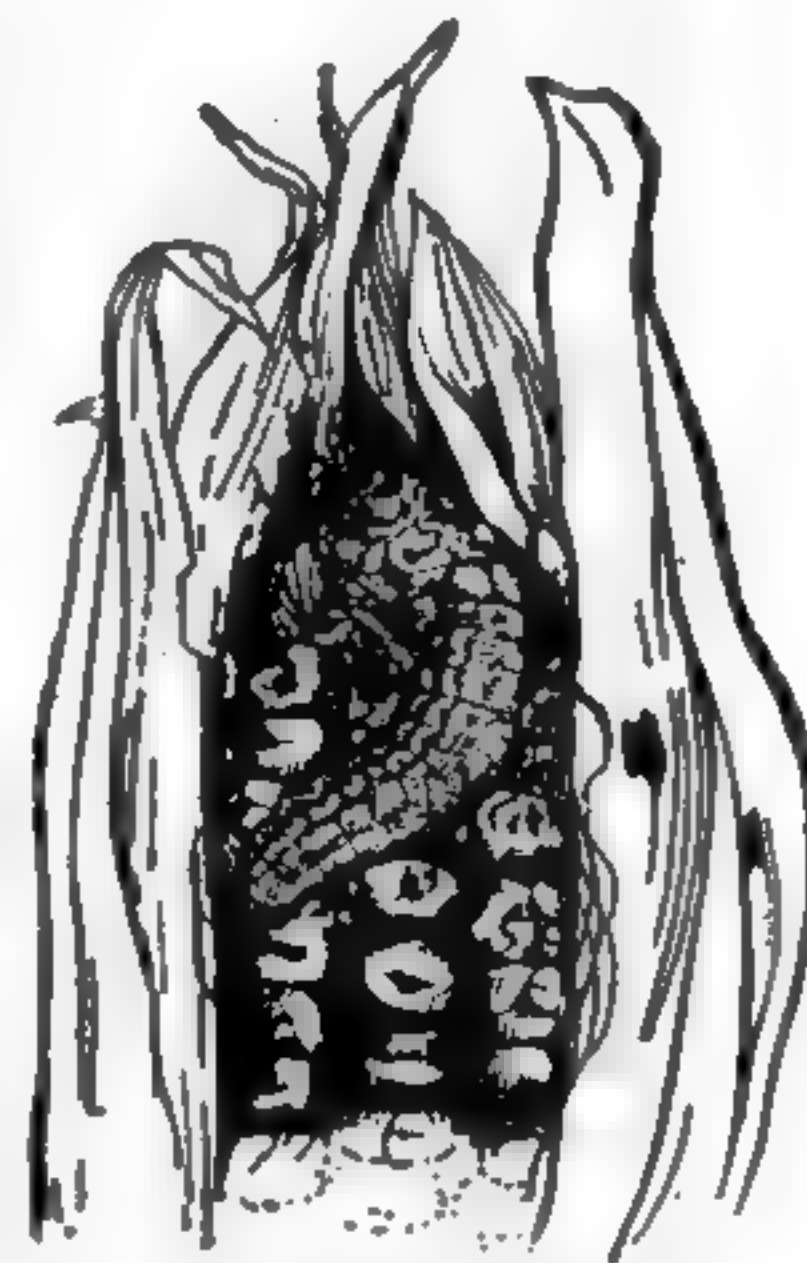
COSMOS

Stalk Borer: See Dahlia.

CRANBERRY

Cranberry Fruit Worm: Pale green larvae infest the berries. Flood the bog for about two weeks as soon as the fruit has been harvested. Destroy all infested berries.

Fireworm or Black-headed Cranberry Worm: Small, pale green, black-headed caterpillars web the leaves and new shoots together and feed inside the nest. Spray with lead arsenate to kill the caterpillars. Flood the bog for three days to kill the pupae.



Corn Ear Worm

Yellow-headed Cranberry Worm: Small, green, yellow-headed caterpillars injure plants in same manner as the preceding. Spray with lead arsenate. Keep bogs flooded until about May 20.

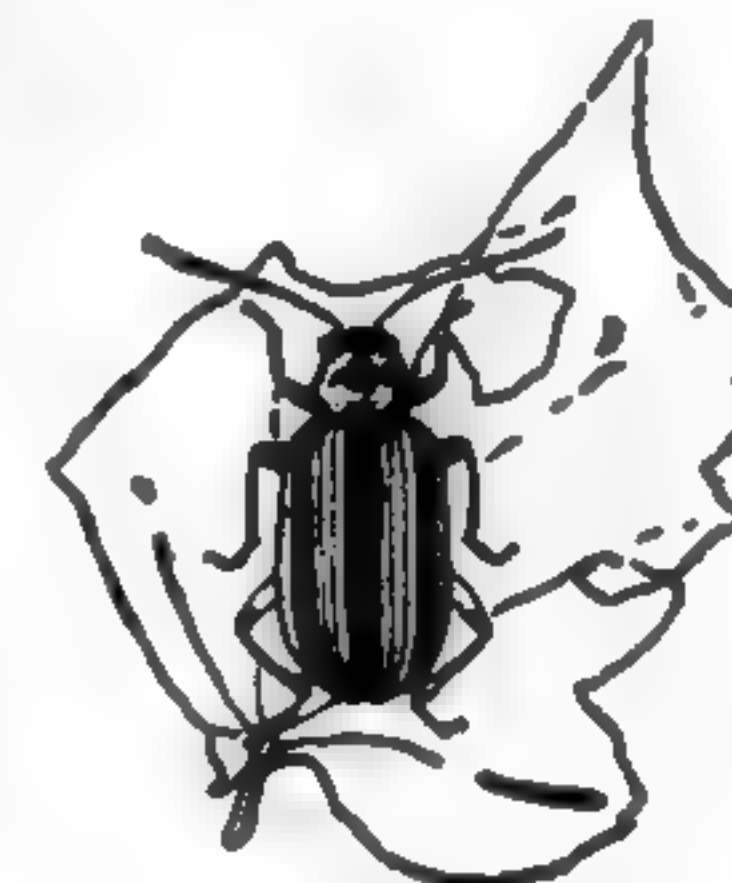
CUCUMBER

Melon Aphid: See Melon.

Pickle Worm: White, yellowish or greenish larvae occasionally burrow in the buds, stems or fruit, inducing decay. There is no satisfactory control. Cultural practices such as early planting, destruction of all spent vines and waste fruits, early Fall plowing, and rotation of crops, will reduce the damage.

Potato Flea Beetle: See Potato.

Striped Cucumber Beetle: Eats the leaves of the young plants. Larvae tunnel in main root or stem just under ground, sometimes killing the plant. Dust plants heavily with land plaster or dry lead arsenate. Cover plants with screens.



Striped Cucumber Beetle

CURRENT

Current Aphid: Yellowish-green aphids suck the sap from the underside of the leaves causing them to curl. Underspray with nicotine solution or kerosene emulsion.

Current Borers: Larvae of two species—one a moth and the other a beetle—burrow in the pith of the stems, cause the leaves to droop and finally kill the canes. Destroy infested canes in May.

Current Stem Girdler: Adults girdle new tips after laying eggs in them. Clip off and burn these tips at any time of the year.

Current Worm: Eats leaves in May. Spray with lead arsenate or fresh Hellebore. Dampen leaves then sprinkle with air-slaked lime.

Four-lined Leaf Bug: An active bug, striped lengthwise with black and yellow, sucking sap from the terminal leaves. Spray with nicotine solution.

San José Scale: See Peach.

Scurfy Scale: A light gray, pear-shaped scale on bark sucking the sap. Spray second week in June with kerosene emulsion or nicotine solution.

CYCLAMEN

Cyclamen Mite: Transparent microscopic mites cause leaves to curl; plants do not blossom.

Som. Spray with, or dip the plants in, nicotine solution (1 part to 400).

DAHLIA

Stalk Borer: Larva burrows up and down inside the main stem, the upper portion usually wilting and dying. Slit the stem lengthwise with care and kill the borer.

Tarnished Plant Bug: Sucks the sap from the stems and developing buds, causing them to drop off. Spray with nicotine solution.

DOGWOOD

Sawflies: The larvae of several kinds feed upon the different kinds of Dogwoods. Spray with Hellebore or lead arsenate.

EGGPLANT

Colorado Potato Beetle: See Potato.

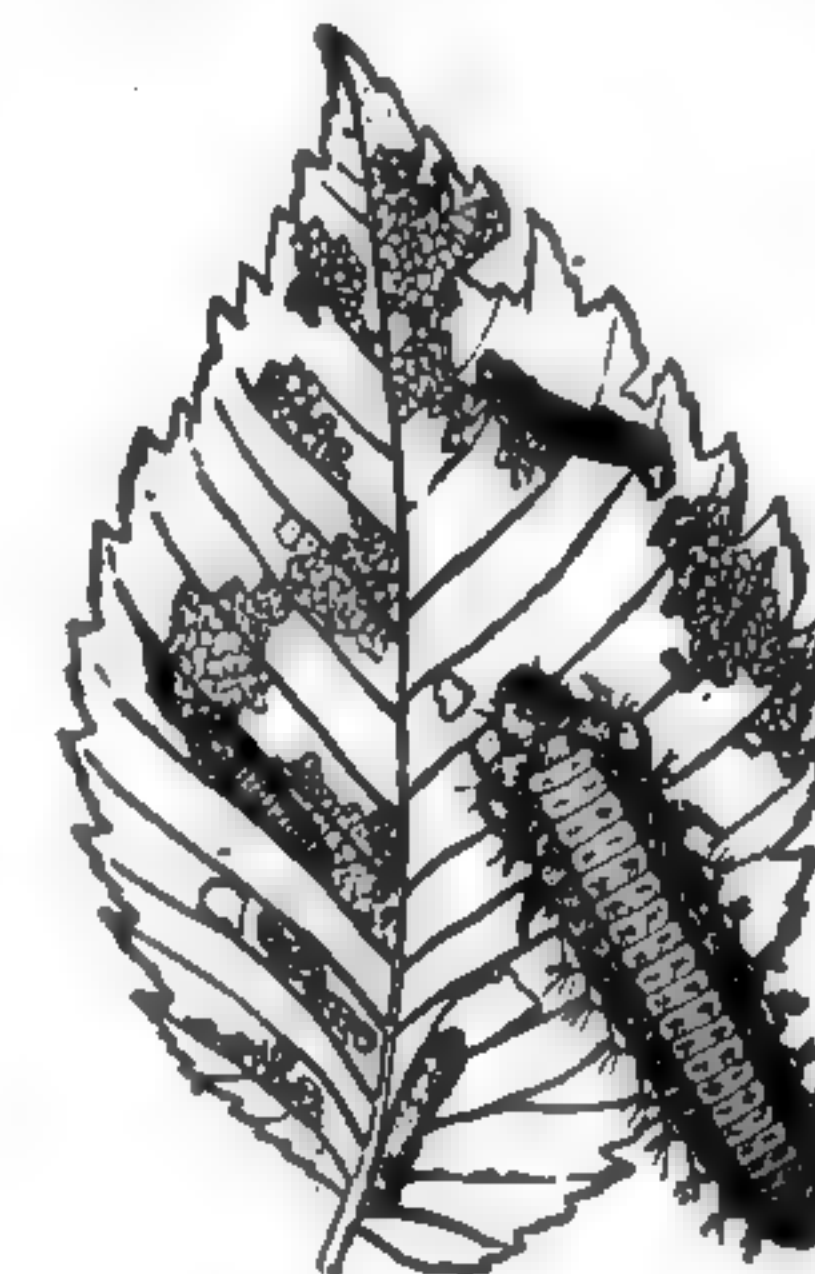
Stalk Borer

Flea Beetle: See Potato.

ELM

Canker Worms: See Apple.

Elm Leaf Beetle: In May the adults eat holes through the leaves, and in June and July the grubs eat the green tissue from the under surface. Spray under surface of leaves with lead arsenate about June 1 to kill the newly hatched grubs.



Elm Leaf Beetle

Elm Scale: Oval, brown, soft scales, with white marginal fringe, occur in the crevices of the bark of the trunk and larger branches. Spray with nicotine solution.

Elm Woolly Aphids: Several species curl the leaves, or form in cottony masses on the bark. Spray with kerosene emulsion.

Gipsy Moth: See Apple.

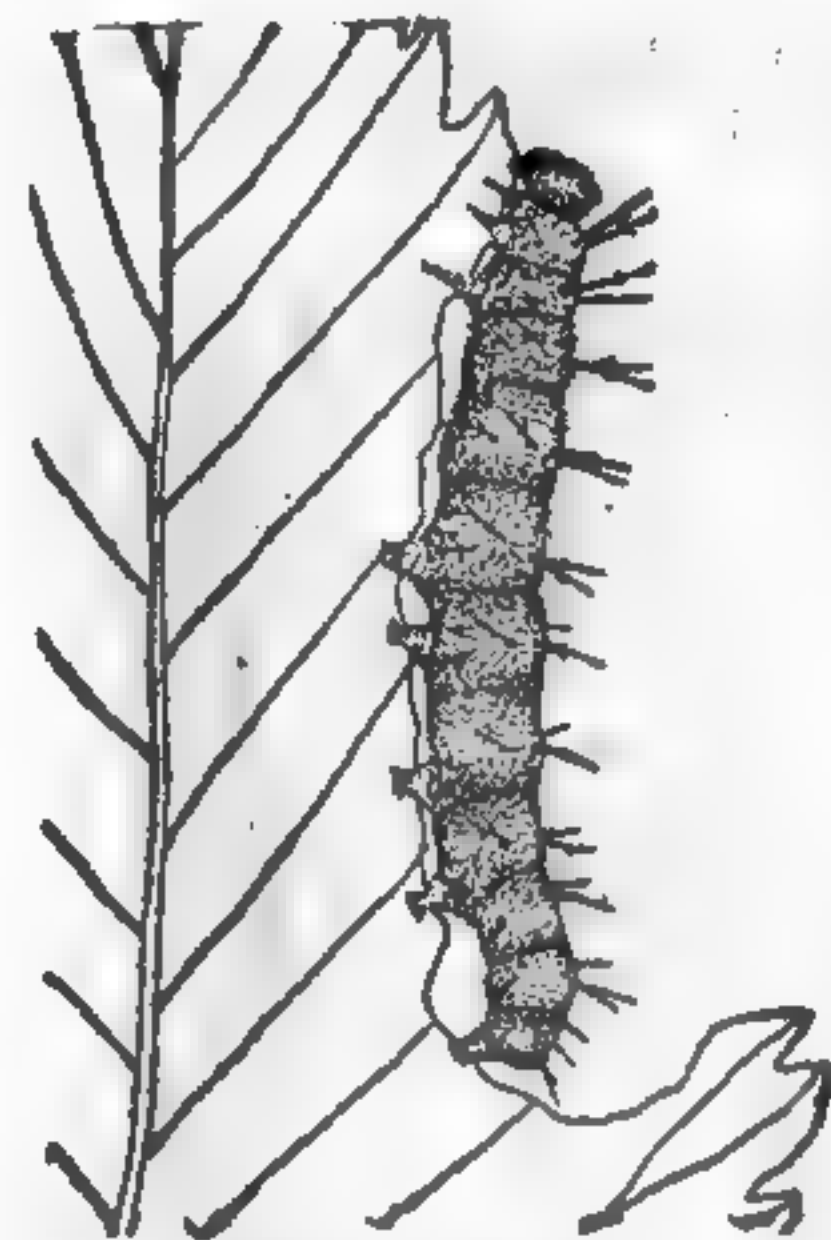
Japanese Beetle: See Rose.



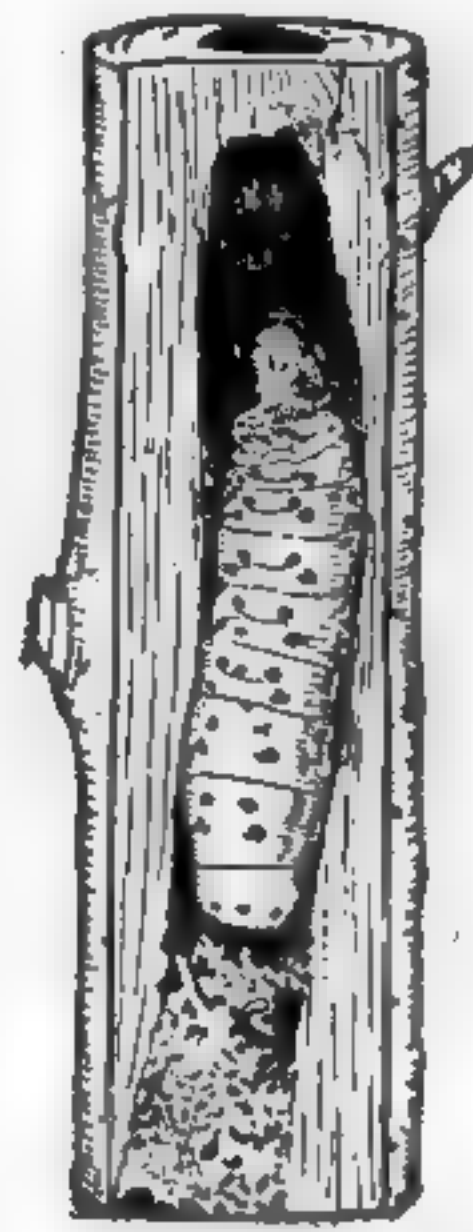
European Elm Scale



Current Worm



Spiny Elm Caterpillar



Leopard Moth Caterpillar

Leopard Moth: Larvae make deep tunnels under the bark, often girdling the branches, which later break off. Small trees may be examined, and the borers killed by injecting carbon disulphide and closing the openings, or by inserting a wire.

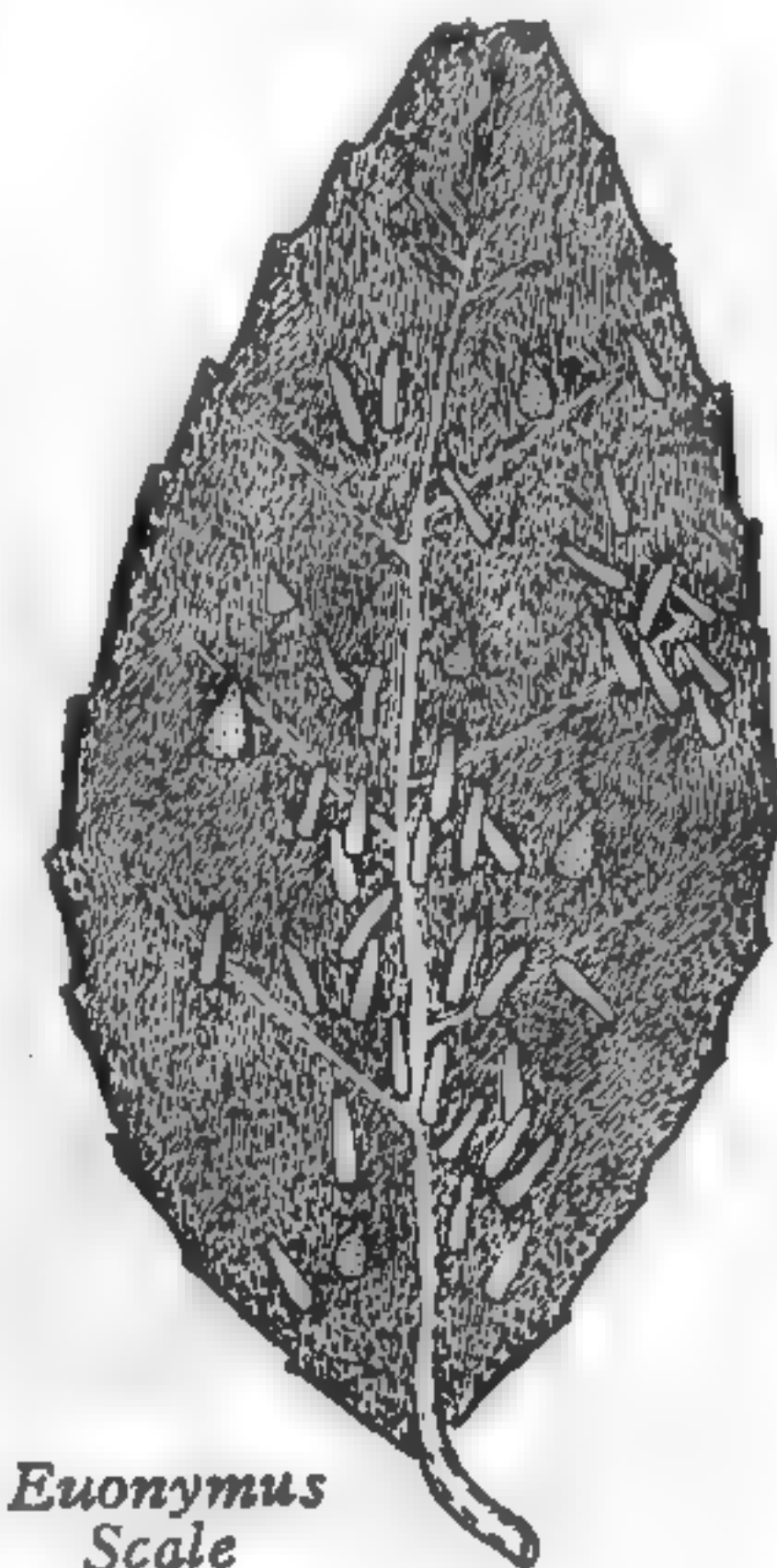
Spiny Elm Caterpillar: Black spiny caterpillars in clusters strip certain branches of Elm, Willow and Poplar. Remove cluster and destroy while caterpillars are small, or spray with lead arsenate.

White Elm Scale: A whitish pear-shaped scale on twigs. Spray about June 10, with kerosene emulsion.

White-marked Tussock Moth: See Horsechestnut.

EUONYMUS

Euonymus Scale: Various species of Euonymus are injured by this scale, which has narrow white shells in the male, and pear-shaped gray or brown shells in the female. Cut and burn the worst infested twigs. Spray in June with kerosene emulsion to kill the young.

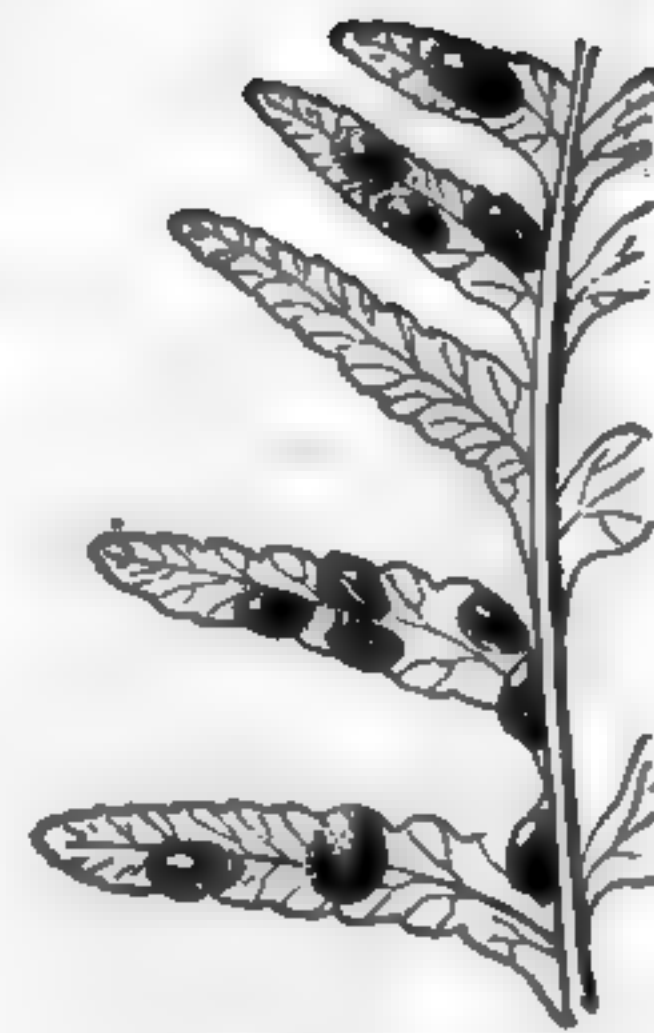


Euonymus Scale

FERN

Hemispherical Scale: Brown, oval, convex scales on fronds of plants, under glass. Apply soap and water or nicotine solution as a dip or spray.

Woolly Bears: Several light brown, hairy caterpillars devour the fronds in late Summer. Spray with lead arsenate.



Hemispherical Scale

GERANIUM

Corn Ear Worm: Occasionally when abundant in late Fall, the caterpillars feed on Geranium cuttings and young plants in the greenhouse. Spray with lead arsenate.

Cyclamen Mite: This mite occasionally injures Geraniums. See Cyclamen.

Greenhouse Leaf Tier: Small, green, wriggling caterpillars feed upon the leaves of plants under glass. See Celery.

Greenhouse Whitefly: See Tomato.

Mealybugs: Often infest Geranium plants in the dwelling and greenhouse. See Coleus.

White Ants: Occasionally, if near a colony, the stems of Geranium plants outdoors are tunneled by white ants. Eradicate the colony.

GLADIOLUS

Gladiolus Thrips: Minute elongated insects, adults with wings, injure flower spikes and hide in the leaf sheaths. Thrips live over Winter on the stored corms. Treat dry corms after harvesting with flake naphthalene in dry paper bags folded tightly at the top for at least two to four weeks.

GOOSEBERRY

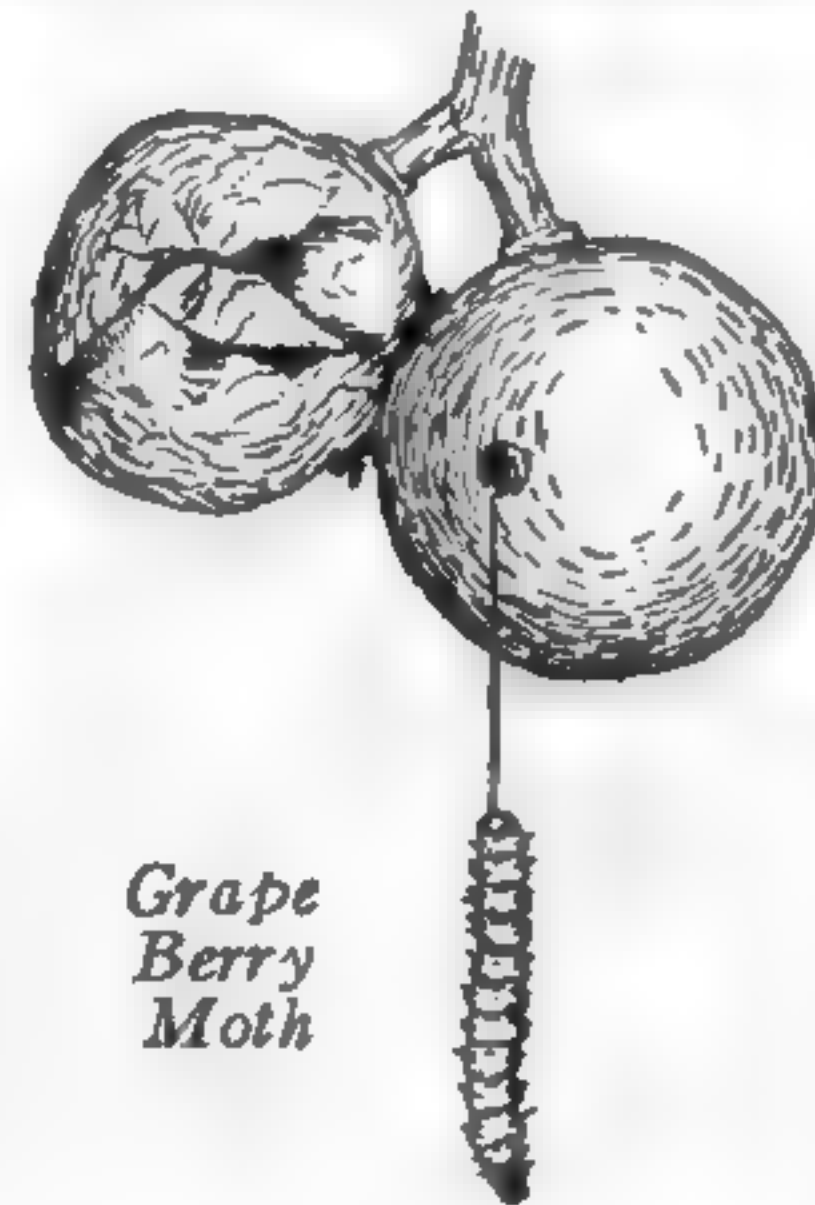
Currant Worm: See Currant.

Gooseberry Fruit Worm: Greenish larvae feed inside the berries. Destroy the infested fruit.

Yellow Currant Fruit Fly: Small maggots infest the berries, which color prematurely and drop. Destroy infested fruit.

GRAPE

Grape Berry Moth: Larvae feed inside the berry. Spray with lead arsenate after fruit sets, and repeat twice at intervals of ten days. Place paper bags over the clusters soon after the fruit sets.



Grape Berry Moth

Grape Leaf Hopper: Small yellow and red-marked leaf hoppers suck sap from underside of the leaves. Spray with nicotine solution.

Grape Phylloxera: Sucks sap from leaves and roots, forming galls, causing serious injury to European varieties. Graft upon stocks of native species.

Grape Plume Moth: Green spiny caterpillars web together the leaves of new shoots. Crush by pinching the nests.

Grape Root Worm: Adults eat chainlike holes in leaves in July, and grubs eat roots, often causing great injury. Spray foliage with lead arsenate.

Grape Vine Flea Beetle: Adults and larvae devour the leaves. Spray with lead arsenate.

Grapevine Tomato Gall: Irregular swellings or galls on the stem, leaves, or tendrils of the tips of the new growth, are caused by a small, two-winged fly. There is no remedy except to remove and destroy the galls.

Japanese Beetle: See Rose.



Grapevine Tomato Gall



Rose Chafer

Rose Chafer: Long-legged, brown beetles appear about the middle of June and feed upon the leaves, flowers and newly set fruit, often doing great damage. Spray heavily with lead arsenate just before blossoms open and, if necessary, again after fruit has set.

Sphinx and other Caterpillars: Several kinds of horn worms, as well as other caterpillars, feed on the leaves. Spray with lead arsenate or practice hand picking.

Spotted Grapevine Beetle: Large, brown beetles, each with six black spots on the wing covers, occasionally feed upon the leaves. Spray with lead arsenate.

GRASS

Army Worm: Occasionally, brown, striped caterpillars are so abundant as to strip the leaves and heads from grass and grain during July; they move like armies from one field to another, sometimes doing great damage. Use poisoned bran mash. Plow deep furrows across the line of march, with steep side barring their progress. Sprinkle worms with kerosene. Spray strips of grass or grain with lead arsenate to protect the fields beyond.

Asiatic Beetle, Japanese Beetle: Grubs of both injure grass of lawns. They resemble white grubs but are smaller. Treat lawns with lead arsenate, 3 pounds to 100 sq. ft.

Fall Army-worm: Attacks lawns and millet in September, like the Army worm, but does not migrate in such large numbers. Same remedies apply. Plow in late Fall.

White Grubs: These are the larvae of June beetles, and when nearly mature and abundant in the soil cause much damage, especially in dry seasons, by eating off the roots of grass, Corn, Potatoes, Strawberries, etc. Plow in Fall to expose insects. Harrow very thoroughly before planting.



Army Worm



White Grub

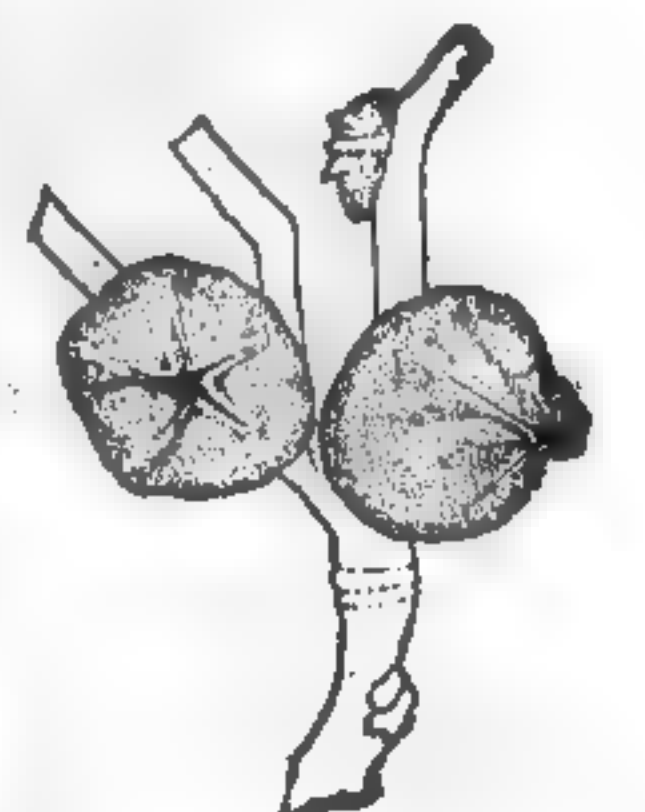
HICKORY

Fall Webworm: See Pear.

Hickory Bark Beetle: Small black beetles breed under the bark, and the galleries soon girdle the tree. The adults emerge through small, round "shot-holes" in the bark. Beetles also feed at base of leaves, causing them to break off and fall in Midsummer. Badly infested trees should be removed before May, and either burned or else the bark removed. Spray healthy trees about June 1 with strong lead arsenate with nicotine solution added.

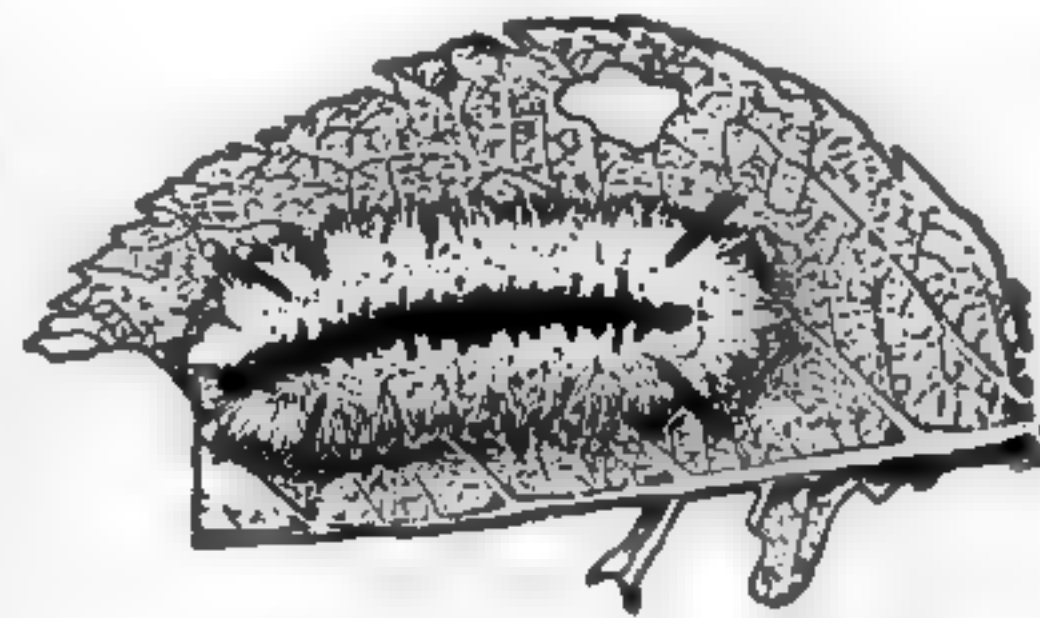
Hickory Borer: Larvae tunnel in solid wood of trunk. The burrows may be found by the sawdust ejected. Inject carbon disulphide into the burrow and close the entrance.

Hickory Gall Aphid: Curious galls on the leaf stems often cause the leaves to fall in Midsummer. Galls contain large numbers of aphids. Spray with nicotine solution just as new growth starts in Spring.



Gall of Hickory Gall Aphid

Hickory Tussock Moth: White and black hairy caterpillars feed upon the leaves in late Summer. Spray with lead arsenate.



Hickory Tussock Moth

Nut Weevils: Larvae infest the fruit or nuts. See Chestnut.

HOLLYHOCK

Stalk Borer: See Dahlia.

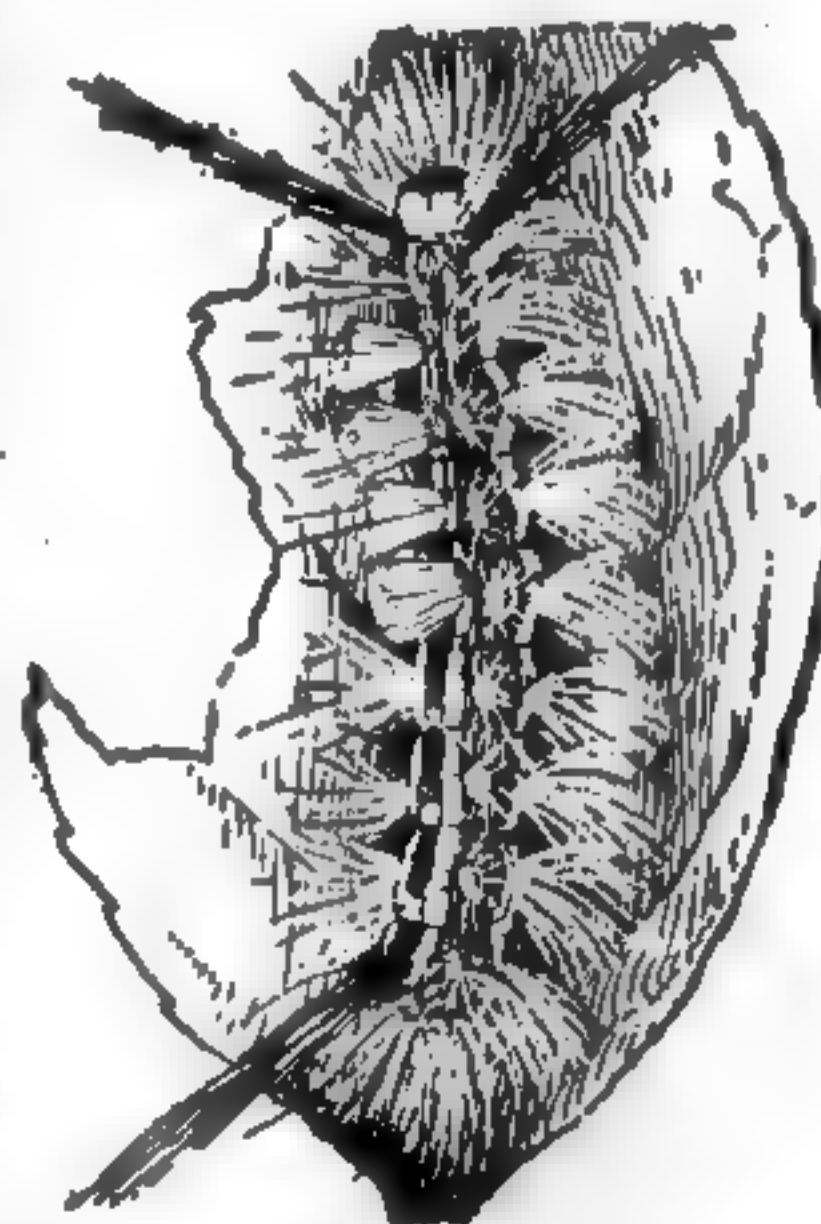
Thistle Butterfly or Painted Lady: Gray spiny caterpillars feed on the upper side of the leaves, usually near the base, and often under a web. Foliage often riddled. Spray with lead arsenate.

HOP

Hop Aphid: Green aphids suck the sap from the under leaf surface. Spray with nicotine solution.

HORSECHESTNUT

White-marked Tussock Moth: Black and yellow, red-headed, hairy caterpillars, each bearing four upright tufts of white hairs, devour the leaves. Spray with lead arsenate.



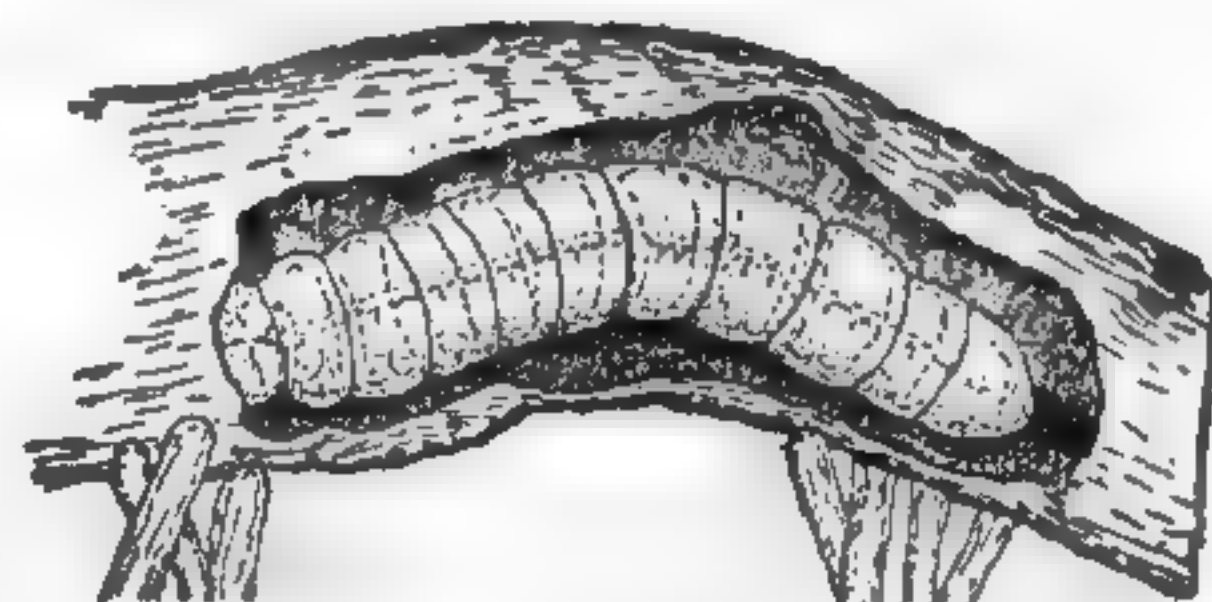
White-marked Tussock Moth

HORSERADISH

Horseradish Flea Beetle: Larvae tunnel in the leaf petioles, and the adults perforate the leaves. Spray with lead arsenate.

HYACINTH

Bulb Mite: See Narcissus.



Iris Borer

IRIS

Iris Root Borer: A pink larva tunnels in the root stocks, injuring many plants. Destroy infested root stocks. Burn over Iris beds in Winter to destroy the eggs.

JUNIPER

Juniper Scale: Small circular whitish scales infest the leaflets and green twigs. Spray with miscible oil, 1 part in 20 parts water, in early Spring.

Juniper Webworm: Small brown caterpillars feed upon the leaves which they web together. Spray with lead arsenate.

Spruce Mite: See Spruce.

LARCH

Larch Case Bearer: Tiny larvae mine inside the leaves which wither and turn brown. They hibernate in brown, cigar-shaped cases fastened by one end to the buds and small twigs. A dormant spray of lime-sulphur will kill the larvae in their cases.

Larch Sawfly: Larvae defoliate trees in Midsummer. Spray with lead arsenate.

Woolly Aphid: White cottony tufts on bark and the leaf whorls in early Summer. Aphids suck the sap. Spray with nicotine solution.

LARKSPUR

Cyclamen Mite: Curles leaves and buds of new growth, which often become swollen, distorted and of purplish color. Spray twice a week with nicotine solution (1-400).

Stalk Borer: See Dahlia.

LETTUCE

Aphid or Green Fly: Sucks sap from the leaves. Spray with soap and water or fumigate beds with tobacco.

Garden Slugs: Devour the leaves at night and hide during the day. They leave a slimy trail wherever they crawl. They may be trapped by placing bits of rubbish around the plants. The plants may be protected by surrounding them with air-slaked or hydrated lime, fine coal ashes or soot as the slugs avoid crawling through dry caustic material.

LILAC

Lilac Borer: A white larva tunnels in the twigs. Cut and burn infested twigs.

Oyster-shell Scale: See Apple.

San José Scale: See Peach.

LILY

Aphid: Yellow aphids with red markings suck the sap from underside of leaves. Spray with nicotine solution.

Stalk Borer: See Dahlia.

LINDEN

Canker Worm: See Apple.

Linden Borer: White larvae tunnel in wood at base of tree. Dig out borer or inject carbon disulphide.

Mulberry Whitefly: On the under side of the leaves are oval nymphs that are dark brown or black fringed with marginal white wax rods. Spray under surface with nicotine.

White-marked Tussock Moth: See Apple and Horsechestnut.

LOCUST

Locust Borer: Larvae tunnel in solid wood of trunk. Inject carbon disulphide into the burrows and close the entrance. Spray trunks and larger branches with a soluble arsenical poison containing 1 quart of miscible oil, and 4 ounces of sodium arsenite or arsenate in 5 gallons of water.

Locust Leaf Miner: The adult is a small, orange-red beetle that feeds on the leaves, and the larva is a miner in the leaves. Spray with lead arsenate as soon as the leaves are nearly full size.

Silver Spotted Skipper: This is a green caterpillar with brown head, that rolls the leaves to make a case and fastens them with silk threads. In this case the caterpillar lives and feeds. Spraying with lead arsenate will prevent defoliation.

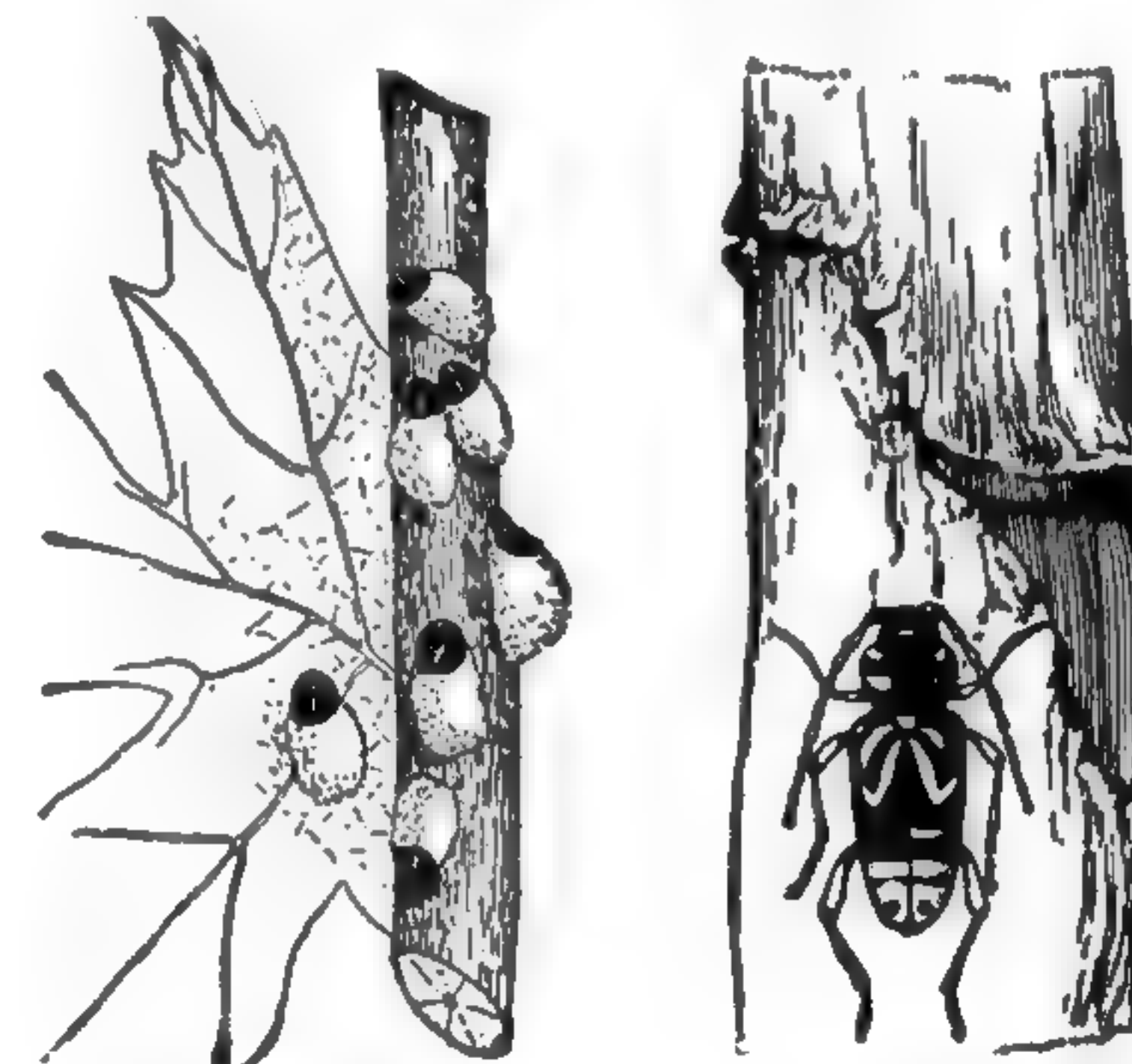
MAGNOLIA

Magnolia Scale: A brown soft scale infests the lower branches, but it may be controlled by a dormant spray of miscible oil or lime-sulphur.

MAPLE

Aphids: Green aphids are common on under surface of leaves of Norway and Sycamore Maples in June. Spray with nicotine solution or kerosene emulsion.

Canker Worms: See Apple.



Cottony Maple Scale

Maple Borer

Cottony Maple Scale: On Red and Silver Maples, large, oval, brown scales pass the Winter on the bark of the branches and in Summer develop conspicuous cottonlike tufts of white wax nearly 1/2 in. in length. Spray with miscible oils.

Maple Borer: Larvae make spiral tunnels just under the bark of trunk or larger branches. Examine the trees in September; the burrows may be located by the sawdust thrown out. Inject carbon disulphide and close the entrance.

Oyster-shell Scale: See Apple.

Terrapin Scale:

Small, reddish brown, oval scales occur on small twigs of Red and Silver Maples, sometimes killing them. If on Red or Silver Maples, spray with kerosene emulsion or miscible oil, but if on Sugar or Norway Maples, use nicotine solution or pyrethrum soap.



Terrapin Scale

White-marked Tussock and Other Tussock Moths: See Apple and Horsechestnut.

WOOLLY MAPLE

Leaf Scale: White cottony masses of wax containing females and eggs occur on the under side of the leaves of sugar Maples in Midsummer; the insects suck the sap and cause the leaves to fall prematurely. Males and larvae are found in the crevices of the bark where the latter pass the Winter in white cases. Spray dormant trees with lime-sulphur and nicotine or with nicotine solution and soap. Burn infested leaves as they drop.



Woolly Maple Scale

MARGUERITE

Marguerite Fly or Leaf Miner: A maggot tunnels between upper and lower surface layers of the leaves. Spray with nicotine solution every 10 or 12 days.

MELON

Melon Aphid: Sucks the sap from the underside of the leaves, curling them and causing much damage if abundant. Under-spray the leaves with nicotine solution or dust with nicotine dust.

Melon Worm: Mottled greenish-yellow caterpillars burrow in the green fruit inducing decay. The first brood caterpillars feed upon the leaves, and many of them can be killed by a spray of lead arsenate. Summer Squash may be planted near as a trap crop to be destroyed later. All vines and waste fruits should be destroyed as soon as the crop is harvested.

Pickle Worm: Similar to the Melon Worm. See Cucumber.

Striped Cucumber Beetle: See Cucumber.

MOUNTAIN-ASH

San José Scale: See Peach.

Scurfy Scale: See Apple.

Round-headed Borer: See Apple.

Woolly Aphid: See Apple.

MOUNTAIN-LAUREL

Mulberry Whitefly: See Linden.

Rhododendron Lacebug: See Rhododendron.

NARCISSUS

Bulb Fly: Maggots infest occasional bulbs and ruin them. There is no remedy except to remove and burn the infested plants.

Bulb Mite: This mite injures nearly all kinds of bulbs and Easter Lily plants in greenhouses, and where bulbs are stored in a warm, moist place. Burn all soft bulbs; store bulbs at about 35 deg. F.; soak for 10 minutes all infested bulbs in nicotine sulphate (1-400) at a temperature of 110 deg. F. or in 2 per cent formalin.

NASTURTIUM

Aphid: Brown aphids cluster on stems and leaves, sucking the sap. Spray with nicotine solution.

OAK

Canker Worms: See Apple.

Brown-tail Moth: See Pear.

Gipsy Moth: See Apple.

Leaf Rollers: Several species of leaf rollers injure Oak trees sometimes defoliating them. Spray with lead arsenate.

Orange-striped Oak-worm: Black and orange striped caterpillars feed upon the leaves late in the season. Spray with lead arsenate.

Pit-making Oak Scale: This green, glossy, circular scale partly sunken in the bark severely injures the English Oak and Chestnut Oak. Spray with miscible oil in early Spring.



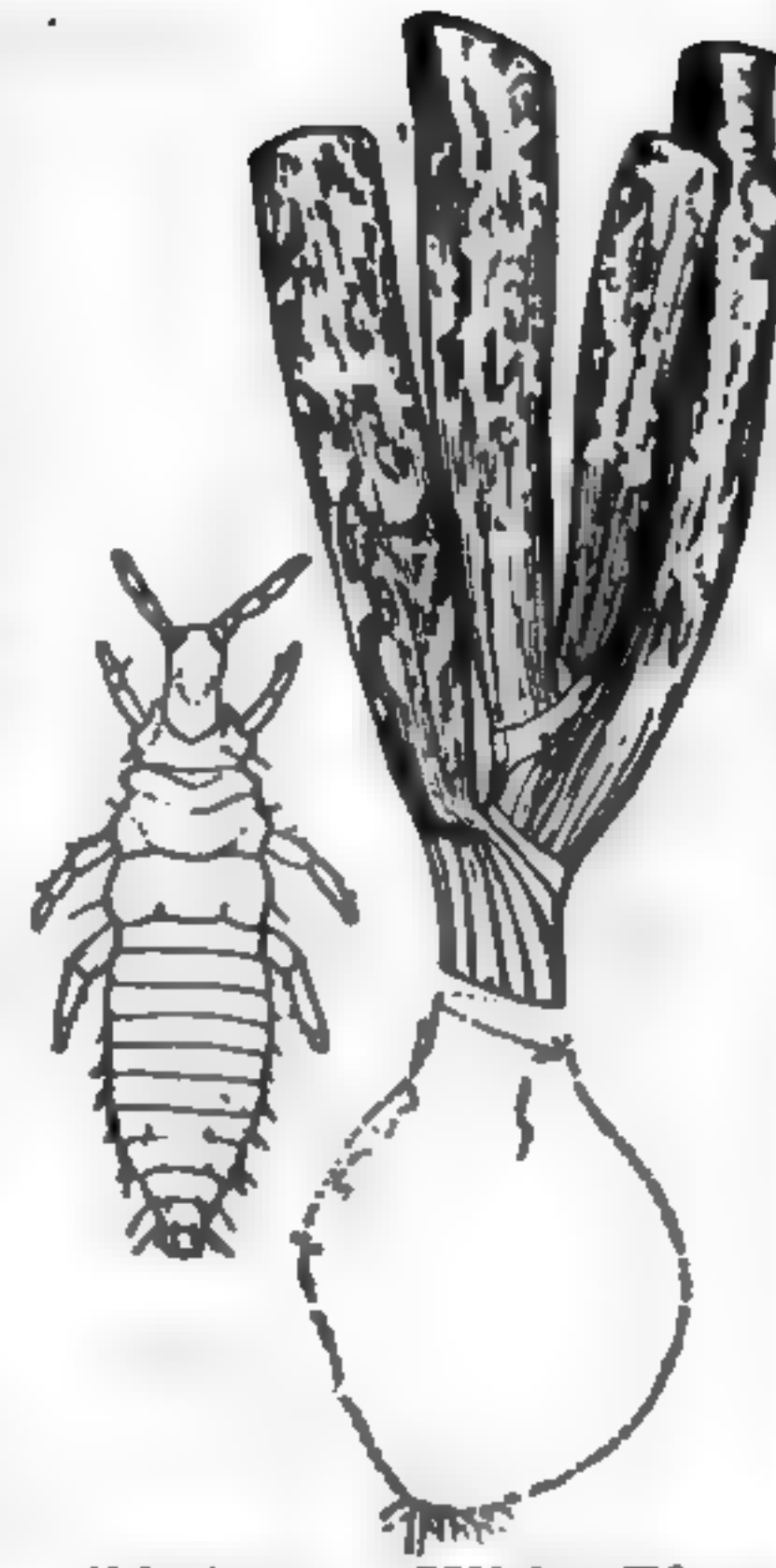
Pit-making Oak Scale

Twig Pruner: The larvae of a long-horned beetle tunnels in the terminal twigs nearly severing them. The twigs are broken off by the wind and fall to the ground with the borers in them. These twigs should be gathered and burned.

ONION

Onion Maggot: Infests the bulb of the young and growing plant. Practice crop rotation. Spray at weekly intervals with sodium arsenate 1/5 ounce, molasses 1 pint, water 1 gallon.

Thrips or White Blast: Very small insects feed upon the surface of the leaves, causing a whitish appearance. Burn all tops and refuse; burn over the grass land around the field to kill over-wintering insects. Spray with nicotine solution.



Thrips or White Blast

PANSY

Cutworms: See Tomato.

Garden Slugs: See Lettuce.

PEONY

Rose Chafer: Feeds on blossoms of white varieties. See Grape.

PALM

Mealybugs: See Coleus.

Scales: Various white and brown scales infest the species of palms found in greenhouses. Apply nicotine solution or soap and water as a spray or as a dip.

PEA

Pea Aphid: Sucks the sap from stems and leaves in June, often causing great injury when abundant. Early varieties may mature a crop before being greatly injured. Spray with nicotine solution and soap or dust with nicotine dust.

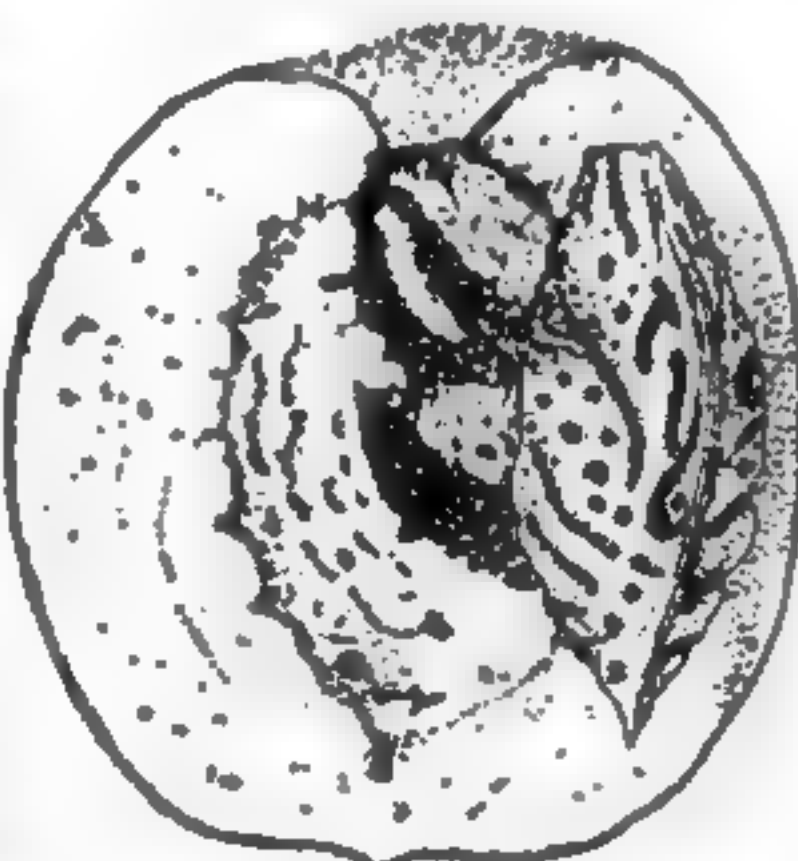
Pea Weevil: The adult lays eggs in the pods in the field, and the larvae develop in the dried seeds and the emerging beetles leave round holes. Fumigate with carbon disulphide or cover with air-slaked lime. See Bean.

PEACH

Black and Green Aphids: Suck sap from leaves and shoots. Spray with nicotine solution.

Oriental Fruit Moth: Larvae tunnel in new shoots in early Summer, but later work in the fruit; they winter in protective cases on bark or on ground, three broods each year. No satisfactory control discovered.

Frequent spraying with nicotine solution and soap, cultivating surface of soil in late Fall and early Spring, and the use of paradichlorobenzene as for Peach borer, are of some benefit.



Oriental Fruit Moth

Peach Borer: Larvae tunnel under bark at base of trunk. Dig them out in May and again in September. Paint trunks with lead arsenate and lime-sulphur from just below the surface to a foot from the ground. Remove the top

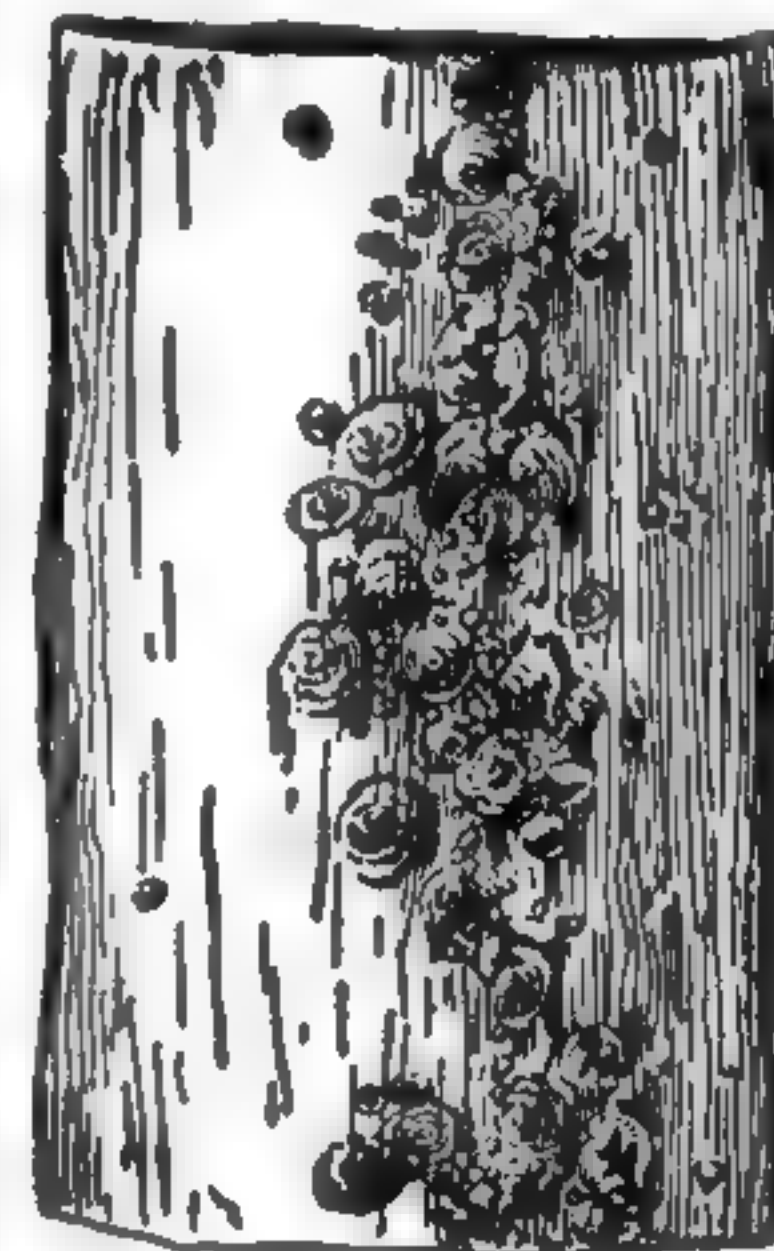


Peach Borer

soil, sprinkle granulated paradichlorobenzene around the trunk, using 1 ounce per tree, and cover with soil. Should not be used on trees less than four years old.

Plum Curculio: See Plum.

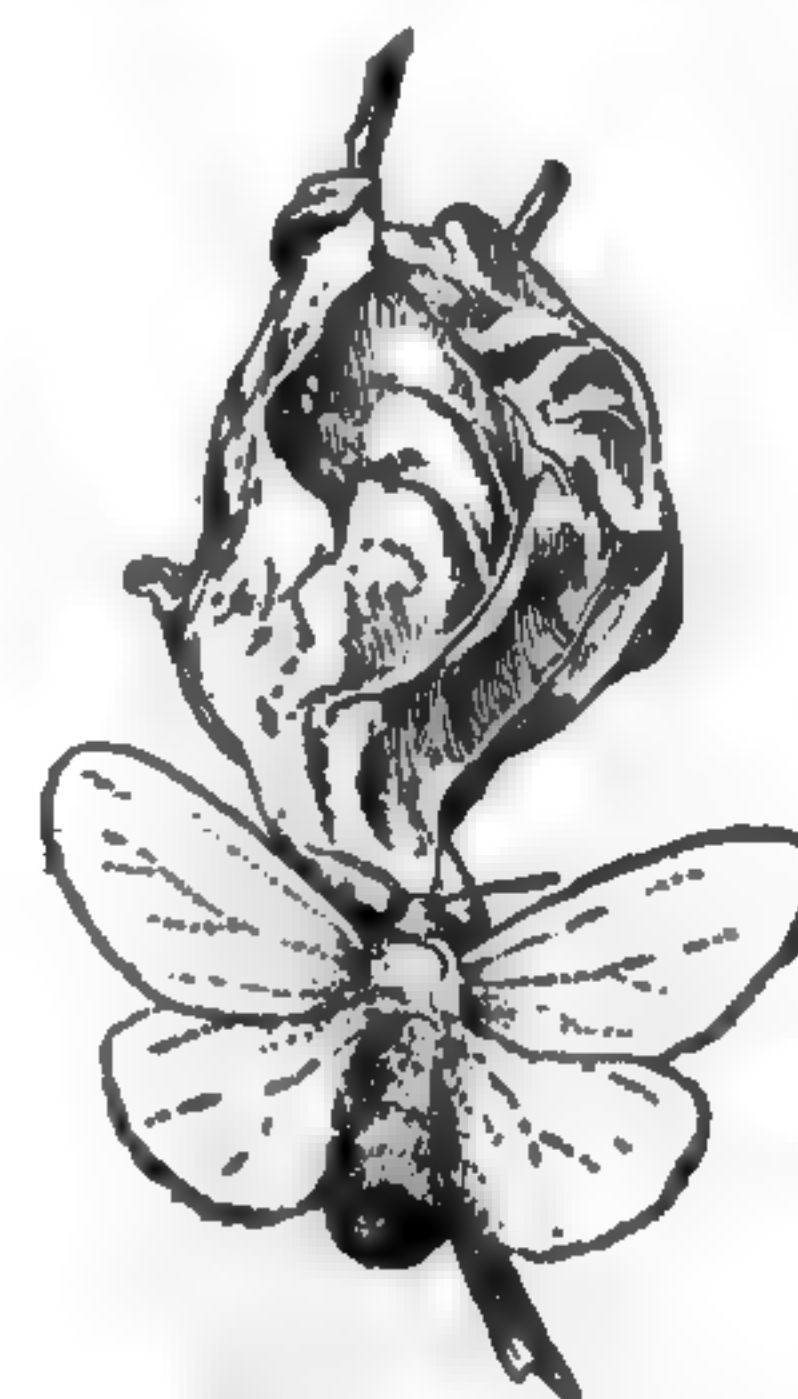
San José Scale: Small, circular shells containing insects which suck the sap from twigs, leaves and fruit. On fruit a red spot surrounds each insect. Spray dormant trees with lime-sulphur.



San José Scale

Shot Hole Borer: Small, black beetles tunnel just under the bark, girdling the tree, and emerging through

small "shot holes." Burn infested trees and keep others thrifty. Coat the bark of the trunk and branches with dormant spray of lime-sulphur.

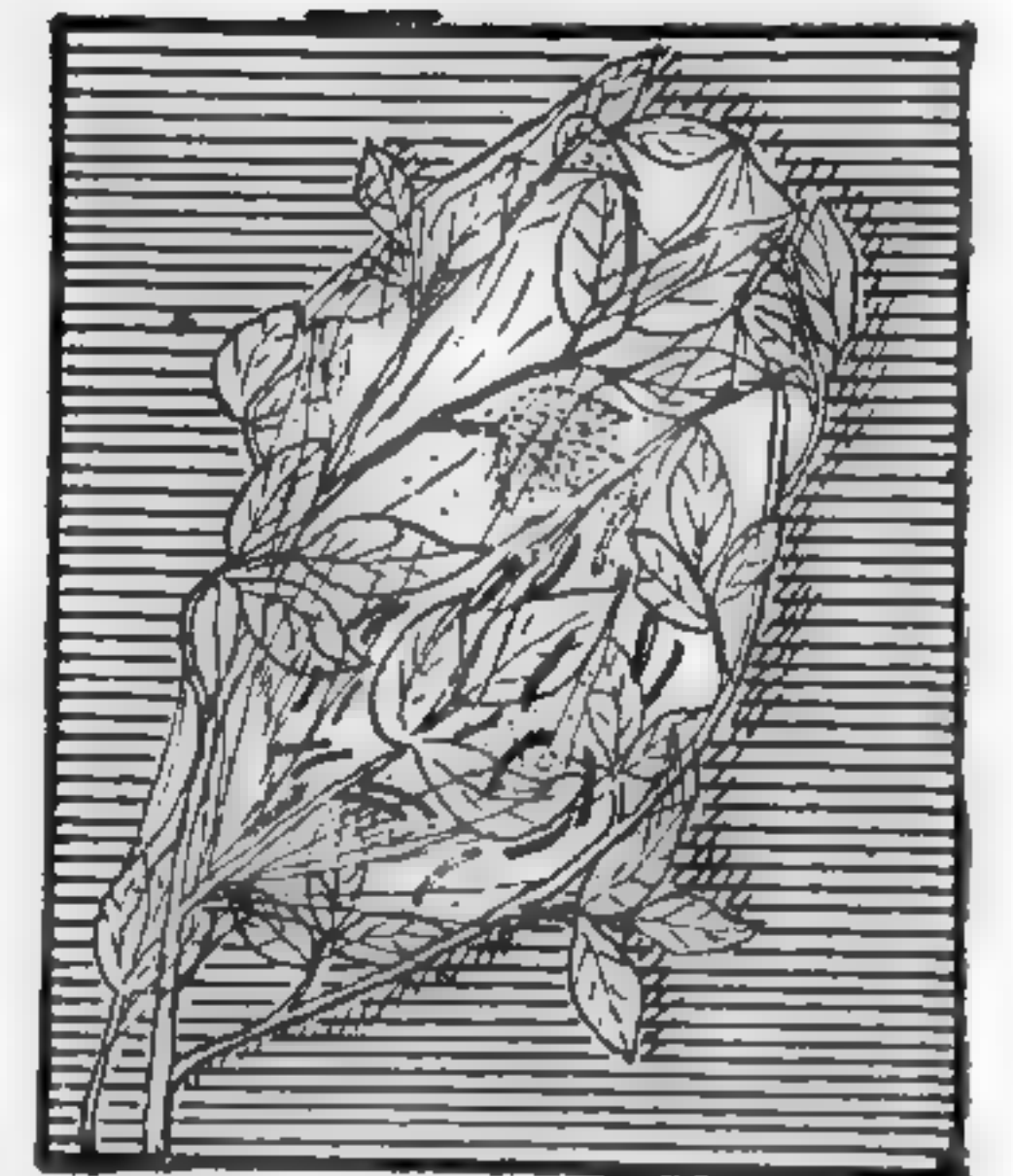


Brown-tail Moth

and feed on leaves in May and June. Cut and burn Winter nests. Spray with lead arsenate as soon as blossoms fall, and again in August.

Codling Moth: See Apple.

Fall Webworm: Brown, hairy caterpillars feed in webs or nests at ends of branches the latter part of Summer. Clip off and burn nests when small. Spray with lead arsenate.



Nest of Fall Webworm

False Tarnished Plant Bug: Punctures the small and developing fruit, causing it to become irregular and knotty. Spray with nicotine solution and soap.

Leaf Blister Mite: Forms galls or blisters on unfolding leaves, causing many leaves to fall in July. Blisters turn red, and later brown. Spray dormant trees in late Fall or early Spring with lime-sulphur or miscible oil.

Pear or Cherry Slug: See Cherry.

Pear Psylla: Jumping plant lice suck sap from leaves and shoots, causing many leaves to fall in July. Spray with lime-sulphur in Spring just before buds open. Spray infested trees with nicotine solution in July to clean up the fruit.

Pear Thrips: A very small insect that feeds upon the fruit buds, destroying them. Spray with nicotine solution just as buds open and again after blossoms fall.

Quince Curculio: The grubs injure Pears in a manner quite different from their injury in Quince, by making a cavity between the skin and the core, with a hardened flattened area on the outside. Spray with lead arsenate about the first week in July.

San José Scale: See Peach.

Scurfy Scale: See Currant.

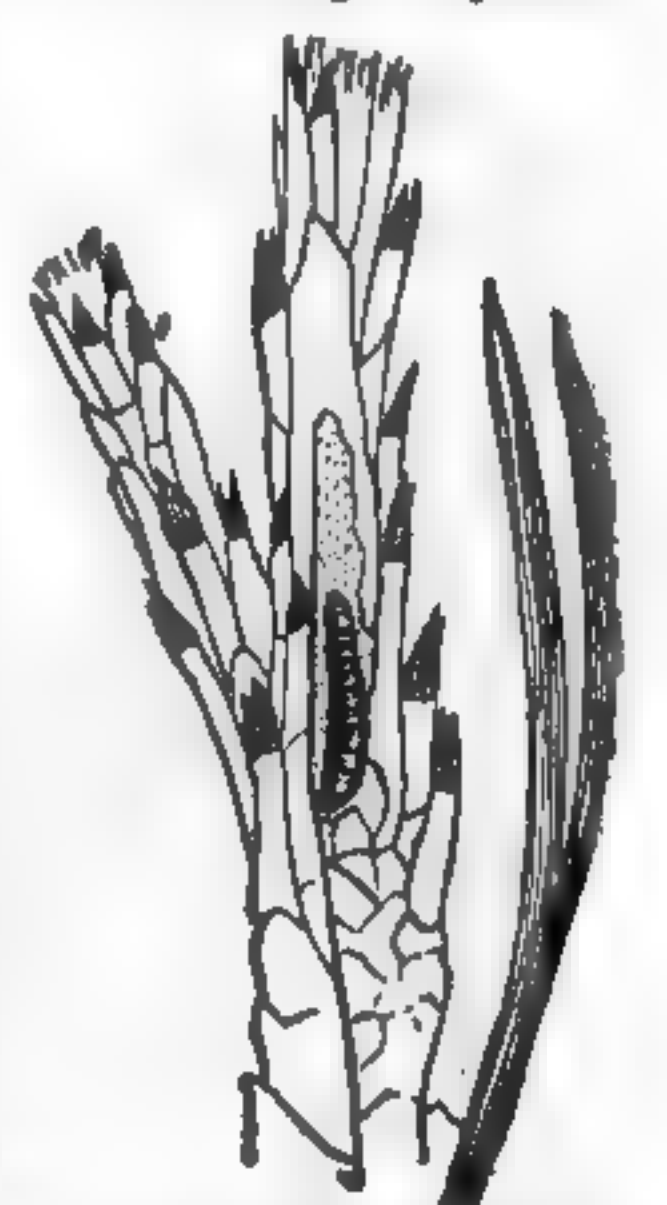
Sinuate Pear Borer: Larvae tunnel under bark in the larger branches often killing them. Cut out the borers and the severely injured branches and spray the foliage heavily with lead arsenate in May.

PHLOX

Red Spider: Injures leaves, causing them to turn yellow. Spray with linseed oil emulsion or with commercial oil called Volck, following directions on the package.

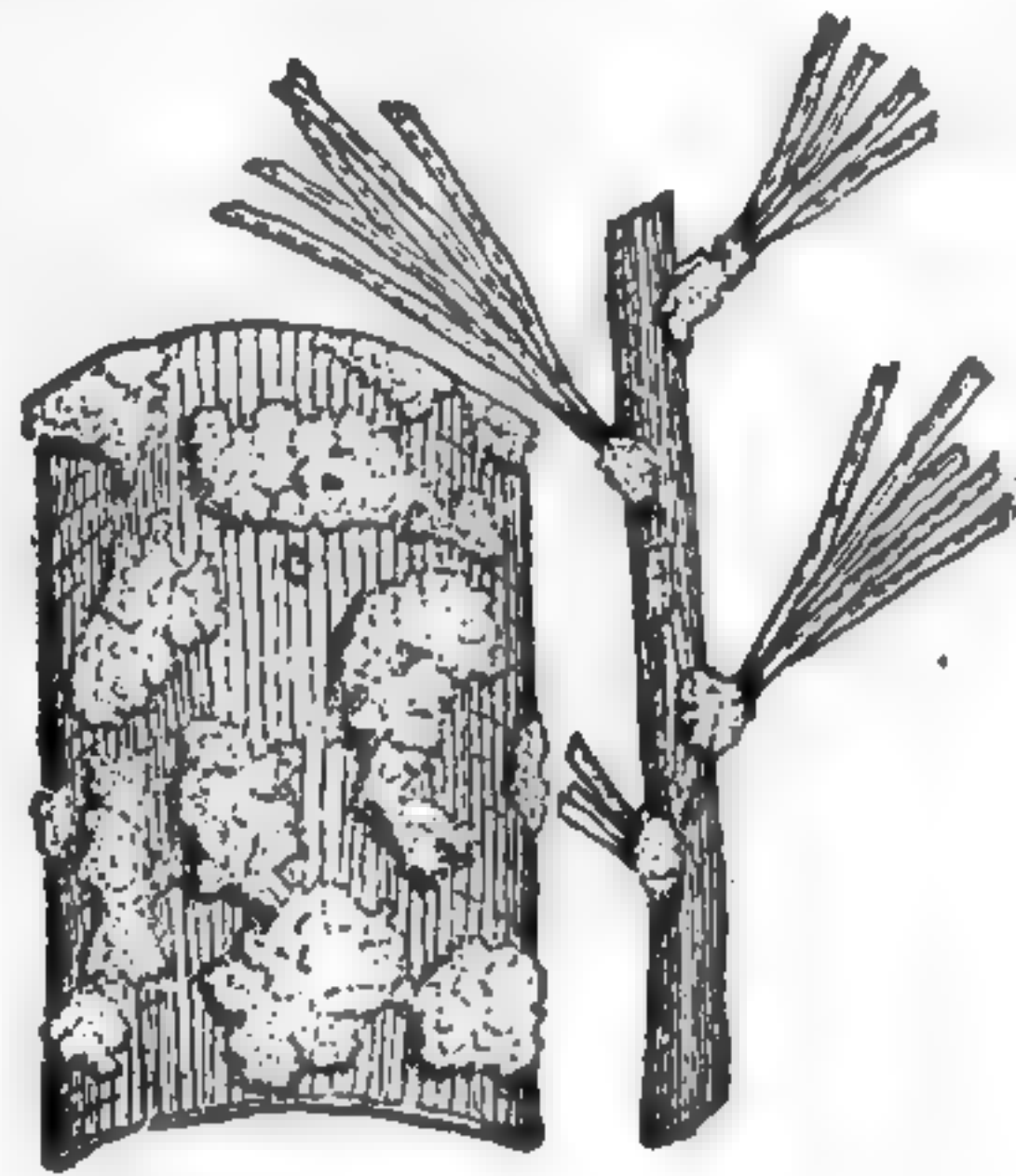
PINE

European Pine Shoot Moth: Red, Scotch, Austrian and Mugho Pines are severely injured by the larvae that tunnel in the buds and new shoots, deforming the trees. Par-



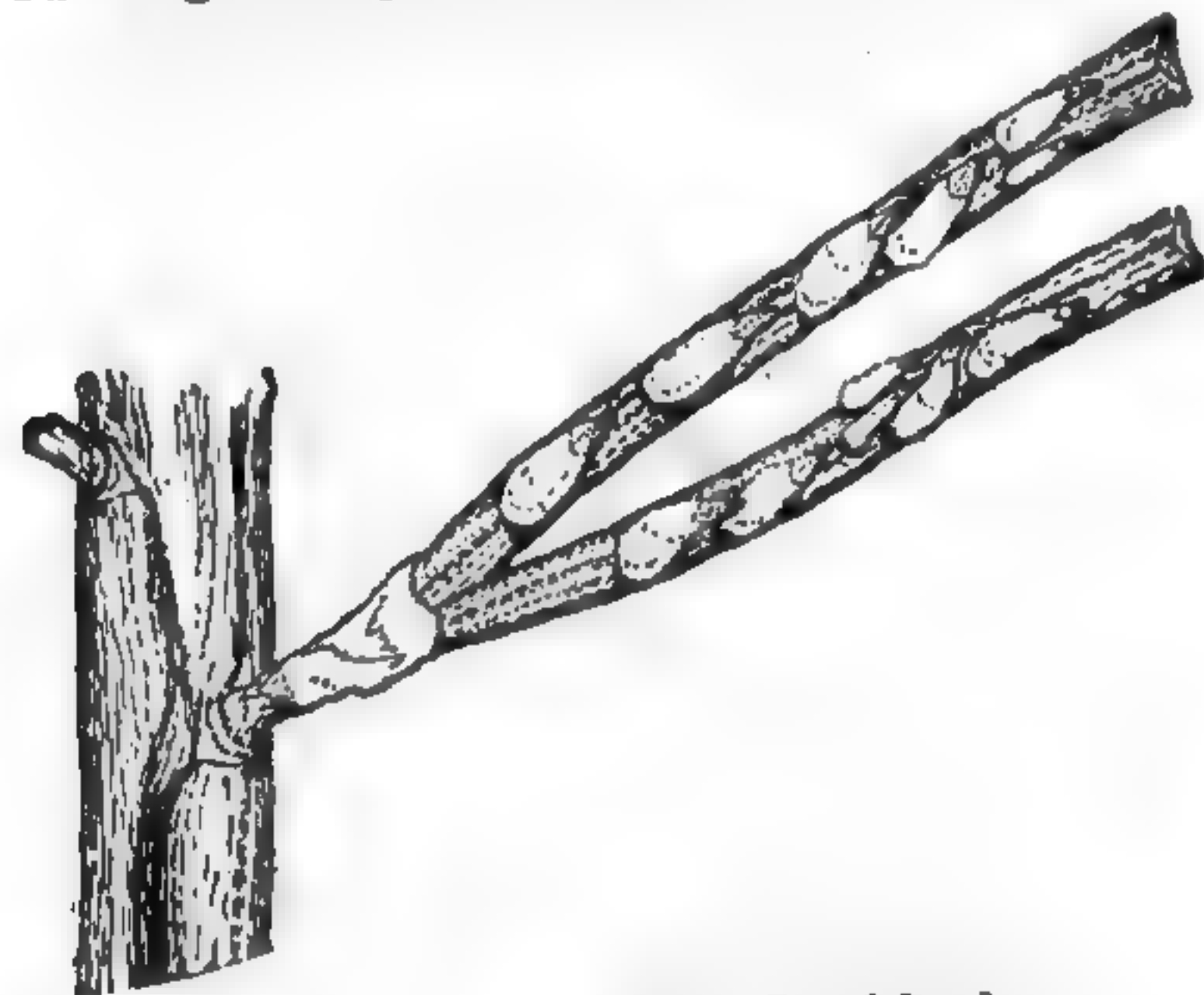
European Pine Shoot Moth

tial control may be obtained by cutting and burning infested tips in late Winter, or by spraying three times at weekly intervals, beginning about June 21, with nicotine sulphate (1-400) with 1 per cent "Penetrol," a commercial oil.



Pine Bark Aphid

Pine Bark Aphid: Aphids with cottony wax secretion form white patches on bark, sucking the sap. Spray with nicotine solution.



Pine Leaf Scale

Pine Leaf Scale: White, pear-shaped shells on leaves contain insects sucking the sap. Occasionally kill small trees. Spray with nicotine solution or kerosene emulsion about the first week in June, and the first week in August.

Pine Sawflies: The larvae of several native and imported species feed upon the leaves. Spray with lead arsenate.

White Pine Weevil. Larvae tunnel under the bark of the leader, causing it to wilt and die in Midsummer. Ornamental trees may be protected by spraying leaders about May 1 with lead arsenate or lime sulphur. Jarring the beetles into a net once a week during May will greatly reduce the damage. Infested leaders should be cut and destroyed before the adults emerge.

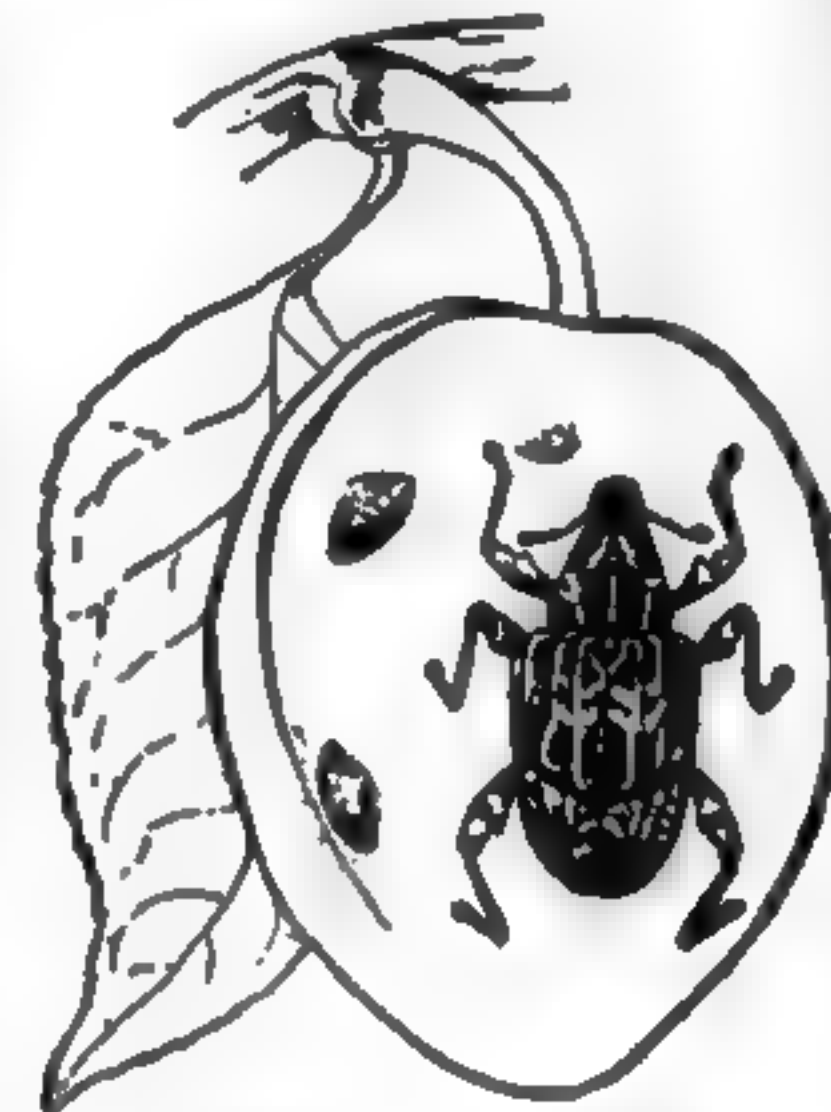
PLUM

Plum Aphids: Suck sap from underside of leaves. Spray with nicotine solution and soap.

Plum Curculio: Grub infests the growing fruit, causing it to fall. Jar the trees once a week, for six weeks after trees bloom, catch the beetles on sheets and destroy them. Also spray during the same period with lead arsenate.

San José Scales: See Peach.

Shot Hole Borer: See Peach.



Plum Curculio

POPLAR

Oyster-shell Scale: See Apple.

Poplar and Willow Curculio: Larvae tunnel in smaller trunk and branches. Destroy badly infested trees. Cut and burn before beetles emerge.

Poplar Borer: Larvae makes large galleries in wood of trunk. Dig out or inject carbon disulphide into the burrow and close the opening.

Poplar Tent Maker: Larvae feed on leaves and fold them together near ends of branches, forming nests. Spray with lead arsenate.

Satin Moth: Blackish hairy caterpillars marked with a network of fine, white lines and a dorsal row of white spots, feed upon the leaves. When small, they hibernate in inconspicuous cases in the crevices of the bark. Spray the foliage with lead arsenate.

Spiny Elm Caterpillar: See Elm.

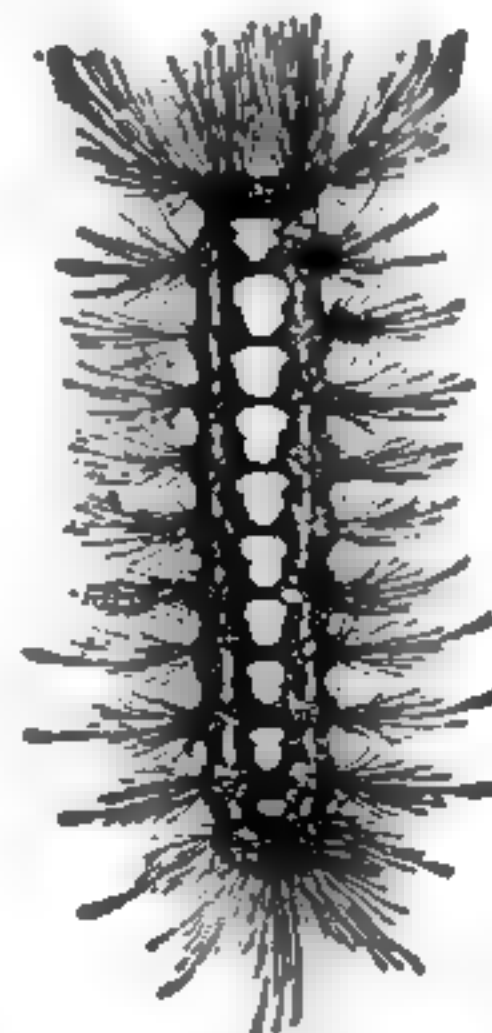
Tussock Moths: See Apple, Hickory and Horsechestnut.

POPPY

Aphids: Black aphids suck the sap from stems and leaves. Spray with nicotine solution.



Poplar and Willow Curculio



Satin Moth Caterpillar

POTATO*

Blister Beetles: Several kinds of blister beetles occasionally feed upon Potato. Spray with lead arsenate. See Aster.

Colorado Potato Beetle: Both adults and larvae devour the leaves. Spray or dust with lead arsenate or calcium arsenate.

Potato Aphid: Green aphids appearing in large numbers suck the sap from the shoots and underside of the leaves, causing much damage. Spray with soap and nicotine solution or dust with nicotine dust.



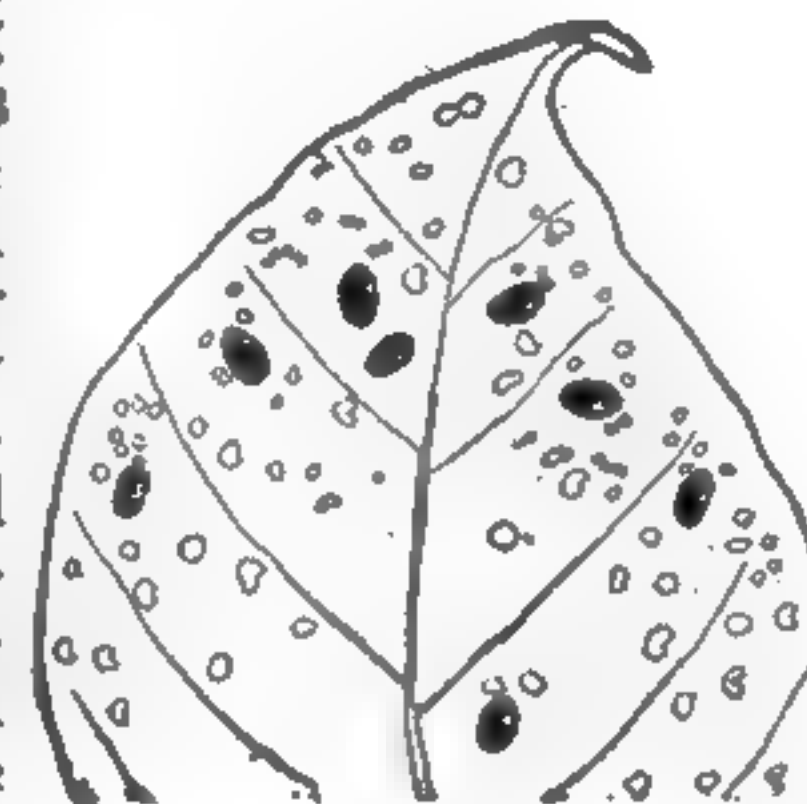
Colorado Potato Beetle



Potato Aphid

Potato Flea Beetle: Small, black, jumping beetles eat holes through the leaves. Spray both upper and under surfaces heavily with lead arsenate. In small gardens, this insect may be controlled by repeated sprays of nicotine solution.

Three-lined Potato Beetle: Larvae feed upon the leaves and carry their black excrement on their backs. Spray with lead arsenate.



Potato Flea Beetle

Tortoise Beetles: Several kinds of tortoise beetles devour the foliage. Spray with lead arsenate.

**Note—*Potatoes require vigilant watching. Watch your crop for three particular enemies: The flea beetles and adult Colorado beetles may appear soon after the leaves show above ground and should be given attention. Larvae of the Colorado beetle do not appear until about the first of June. About July 1 watch for aphids and spray to eradicate the incipient colonies before the aphids spread over the whole field. Unless promptly checked the aphids will ruin your entire crop in a few days.

PRIVET

Privet or Lilac Borer: Larvae tunnel in the stems. Remove and destroy infested stems.

QUINCE

Aphids: See Apple.

Oriental Fruit Moth: See Peach.

Quince Curculio: Adults feed upon, and the grubs feed inside, the growing fruit, causing it to be knotty. Jar the trees as for Plum curculio. Spray with lead arsenate.

Round-headed Borer: See Apple.

RADISH

Aphid: See Turnip.

Maggot: See Cabbage.

RASPBERRY

Raspberry Cane Borer: Larvae tunnel inside the canes. Cut and burn infested canes.

Raspberry Fruit Worm: Small, brown beetles devour leaves, buds and blossoms; whitish larvae adhere to berries when harvested. Spray with lead arsenate when beetles first appear.

Raspberry Sawfly: Larvae feed upon the leaves. Spray with lead arsenate or Hellebore.

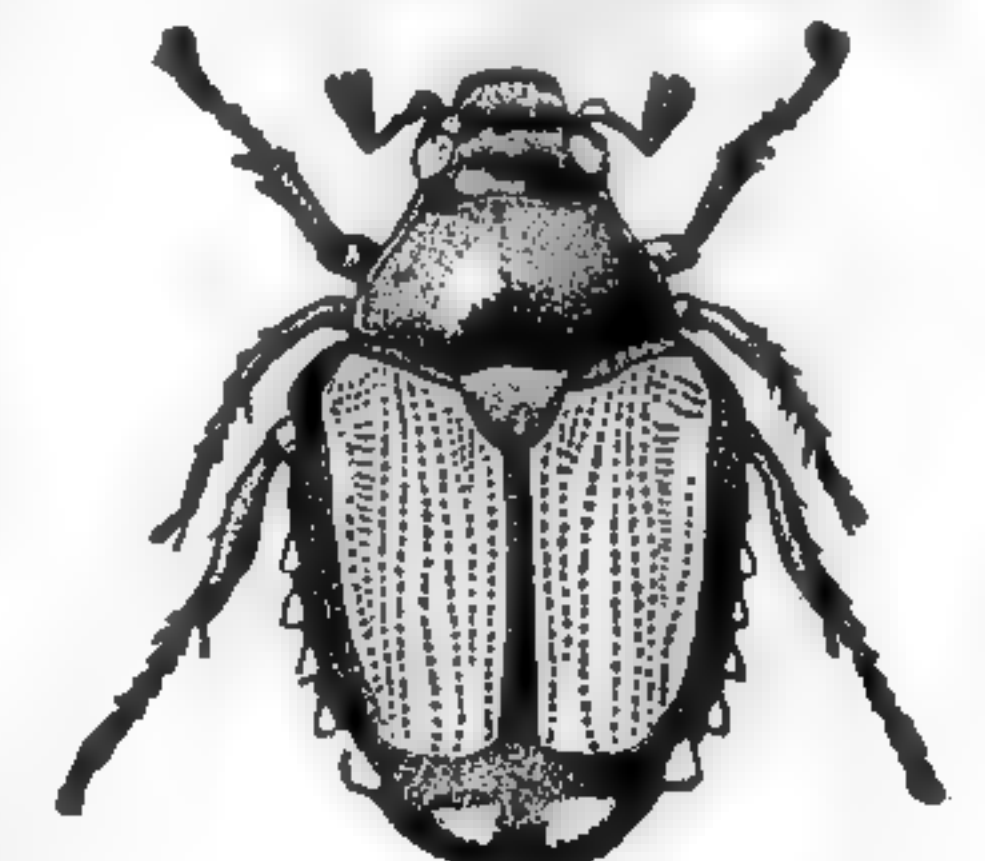
RHODODENDRON

Rhododendron Borer: White larvae burrow under the bark of stems, especially near the crotches. Cut out the borers and apply melted paraffin to the wounds.

Rhododendron Lace Bug: Sucks the sap from the under surface of the leaves, leaving brown spots of excrement. Spray with nicotine solution or kerosene emulsion.

ROSE

Japanese Beetle: The adult beetles feed upon Rose, Grapevine,



Japanese Beetle

Apple, Peach, Cherry and many other kinds of trees and shrubs. The larvae or grubs feed upon grass roots. (See Grass). Spray foliage with special preparation called "coated lead arsenate."

Rose Aphid or Green Fly: Sucks the sap from the tender leaves and shoots. Dip the shoots in, or spray with nicotine solution.

Rose Chafer: See Grape.

Rose Curculio: Red and black snout beetles eat holes into the buds of *rugosa* and some other kinds of Roses. Practice hand picking or spray with lead arsenate.



Rose Leaf Hopper

Rose Leaf Hopper: Whitish, jumping and flying insects which suck the sap from the underside of the leaves. Spray with nicotine solution.

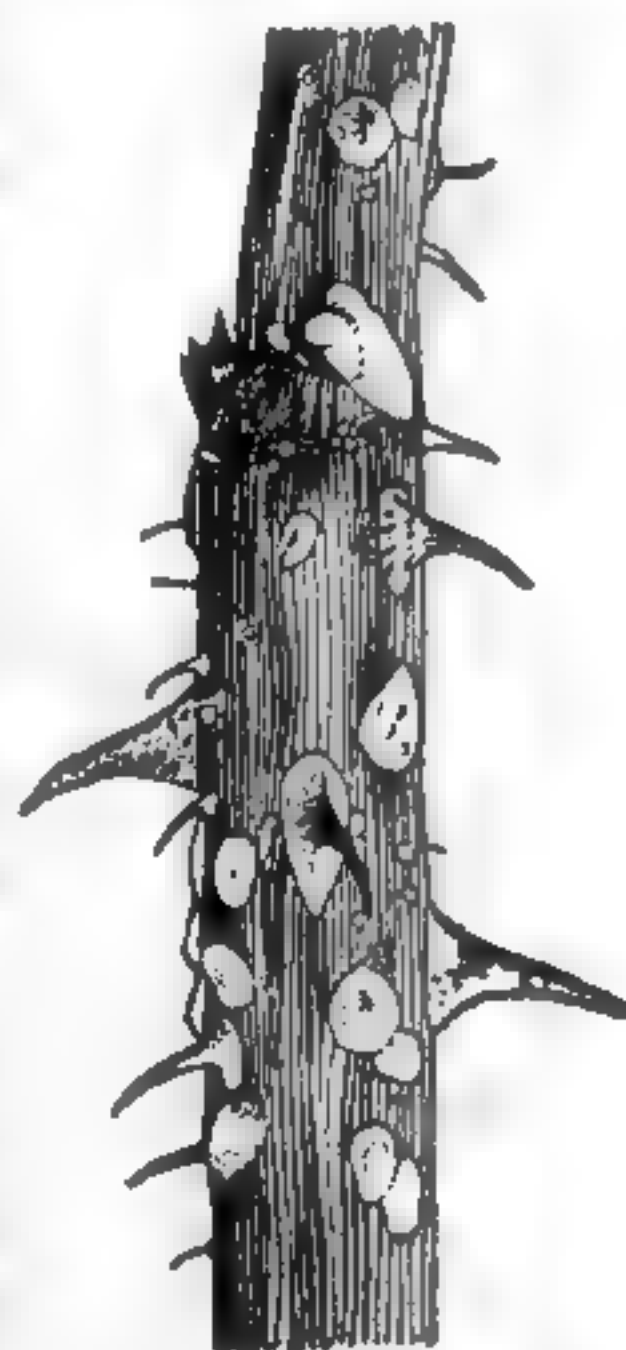
Rose Leaf Rollers: Several species of leaf rollers injure Roses. Gather and burn the rolled leaves or spray with lead arsenate.

Rose Midge: Larvae or maggots distort tender leaves and flower buds in greenhouses. Treat soil with tobacco dust and fumigate each night with tobacco stems or nicotine paper.

Rose Scale: Whitish, circular shells on the stems contain insects which suck the sap. Cut and burn the worst infested stems. Spray with nicotine solution.

Rose Slug or Sawfly: Eats away the green tissues of the leaves, only the network remaining. Spray with lead arsenate, Hellebore, or nicotine solution.

Rose Stem Girdler: The grub of a beetle tunnels in the twigs particularly of *rugosa* and *hugonis* Roses, causing swellings or galls. The twigs often die or break off. Cut and burn all galled twigs.



Rose Scale

RUBBER PLANT

Circular Scale and Morgan's Scale: Both are circular and dark reddish brown, the former almost cone-shaped and the latter quite flat, and occur on the under surface of the leaves. Spray with nicotine sulphate or pyrethrum.

Mealybugs: See Coleus.

SNAPDRAGON

Cyclamen Mite: Causes leaves to curl and plants do not blossom. Spray with nicotine solution. See Cyclamen.

SNOWBALL

Aphids: Suck sap from the leaves, causing them to curl. Dip in, or spray with nicotine solution.

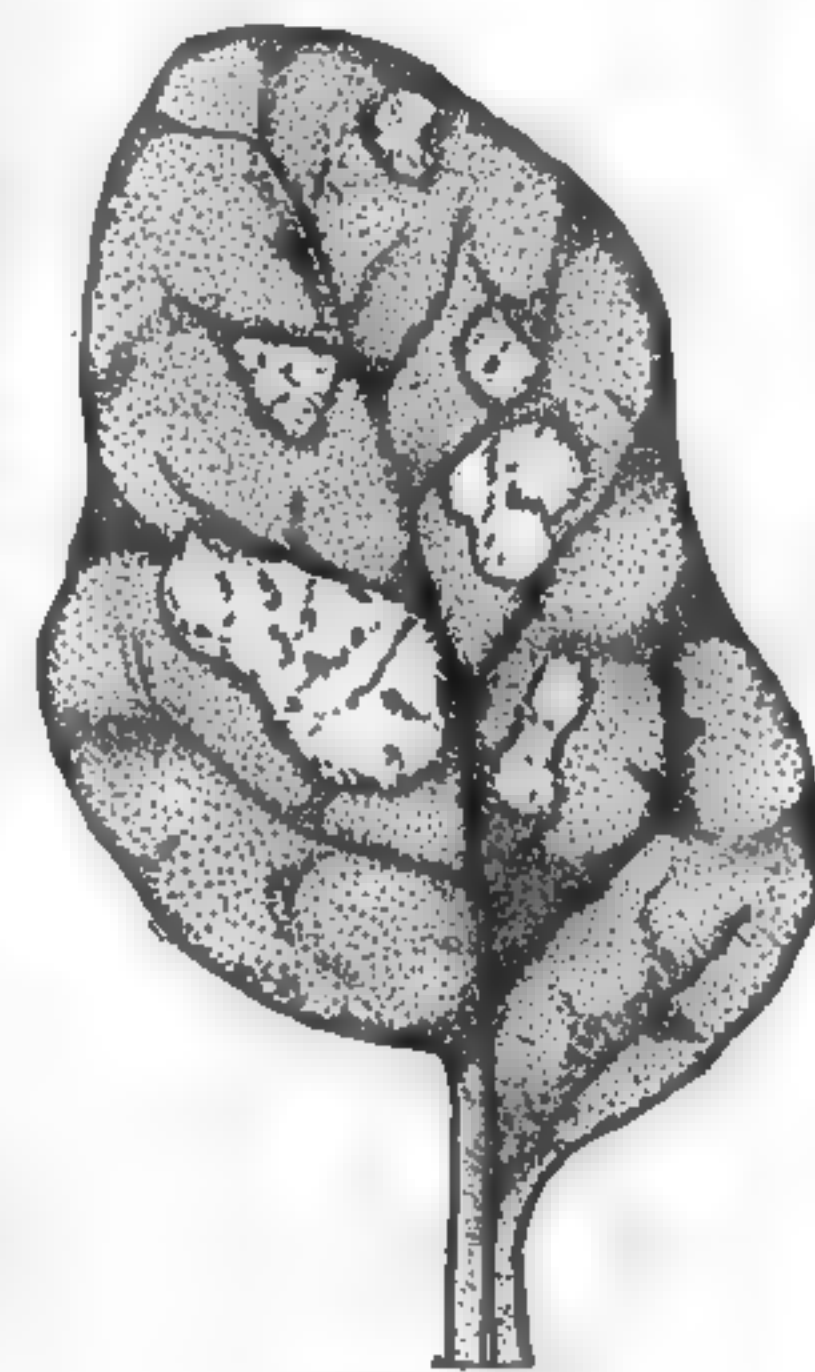
SPINACH

Aphids: The Spinach aphid and other species often infest Spinach leaves. Dust heavily with nicotine dust under a cloth to hold the fumes.

Garden Spring-tail: See Beet.

Potato Flea Beetle: See Potato.

Spinach Leaf Miner: A small fly lays eggs in the leaves and the maggots tunnel or mine between the upper and lower leaf surfaces. Destroy all infested leaves and practice late Fall plowing. Destroy all plants of the weed known as Lambs-quarters in which this insect breeds. Possibly a spray of pyrethrum soap may kill the maggots in the leaves.



Leaf Miner

SPIRAEA

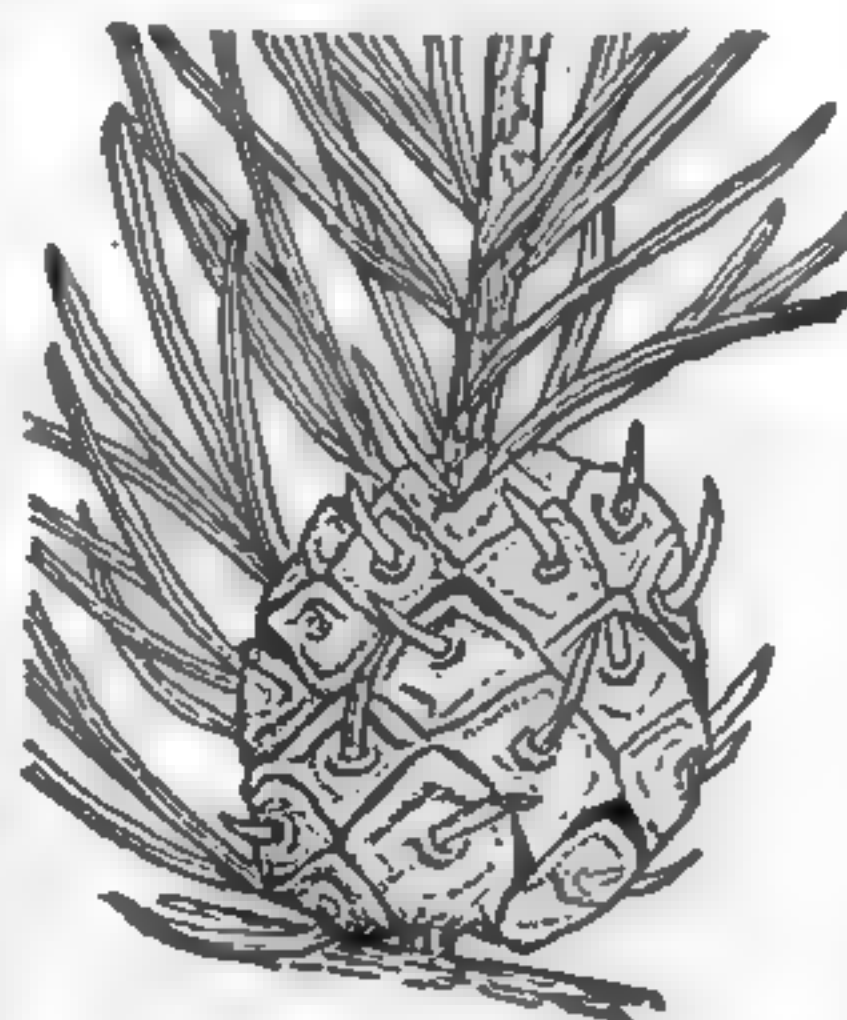
Aphids: Suck the sap from the new shoots. Use nicotine solution as a spray or dip.

Leaf Roller: The larvae of a small moth web together the new leaves and feed inside the nests. Spray with lead arsenate.

SPRUCE

Spruce Bud Moth: Larvae feed on leaves of terminal shoots of the branches, often causing much damage. Spray with lead arsenate.

Spruce Gall Aphid: Forms galls at the base of the new growth on Norway and other Spruces. Spray before the middle of April with lime-sulphur (1-9), miscible oil (1-25), nicotine solution and soap, or with kerosene emulsion.



Gall of Spruce
Gall Aphid

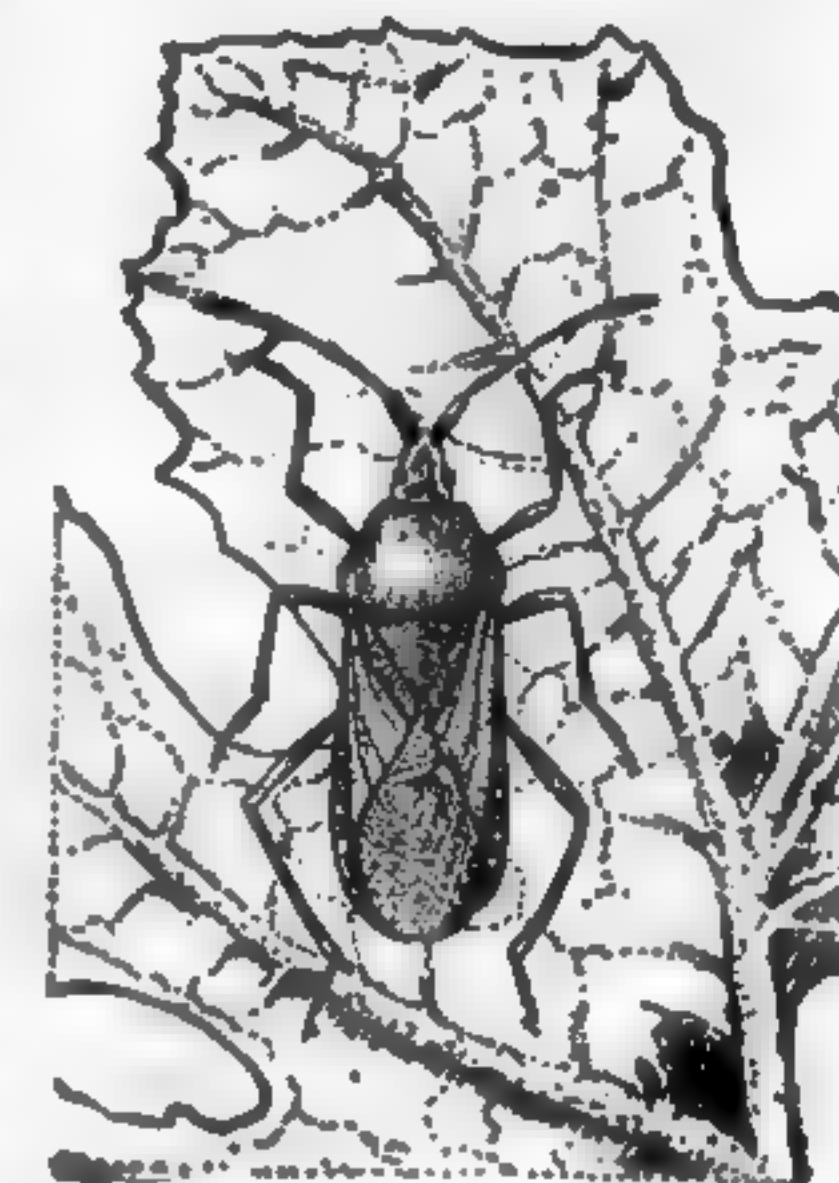
Spruce Mite: Infests Spruce and other conifers; sucks juices from the leaves, causing a gray, unhealthy appearance, with webs often encasing leaves and twigs. Spray with linseed oil emulsion; glue, 1 pound in 10 gallons water; or with Volck.

SQUASH-PUMPKIN

Melon Worm: See Melon.

Pickle Worm: See Cucumber.

Squash Bug or Stink Bug: A brown bug, three-fourths of an inch in length, which sucks the sap from the underside of the leaves, causing them to wilt and die. Underspray with nicotine solution and soap or with pyrethrum soap to kill the young. The old bugs and

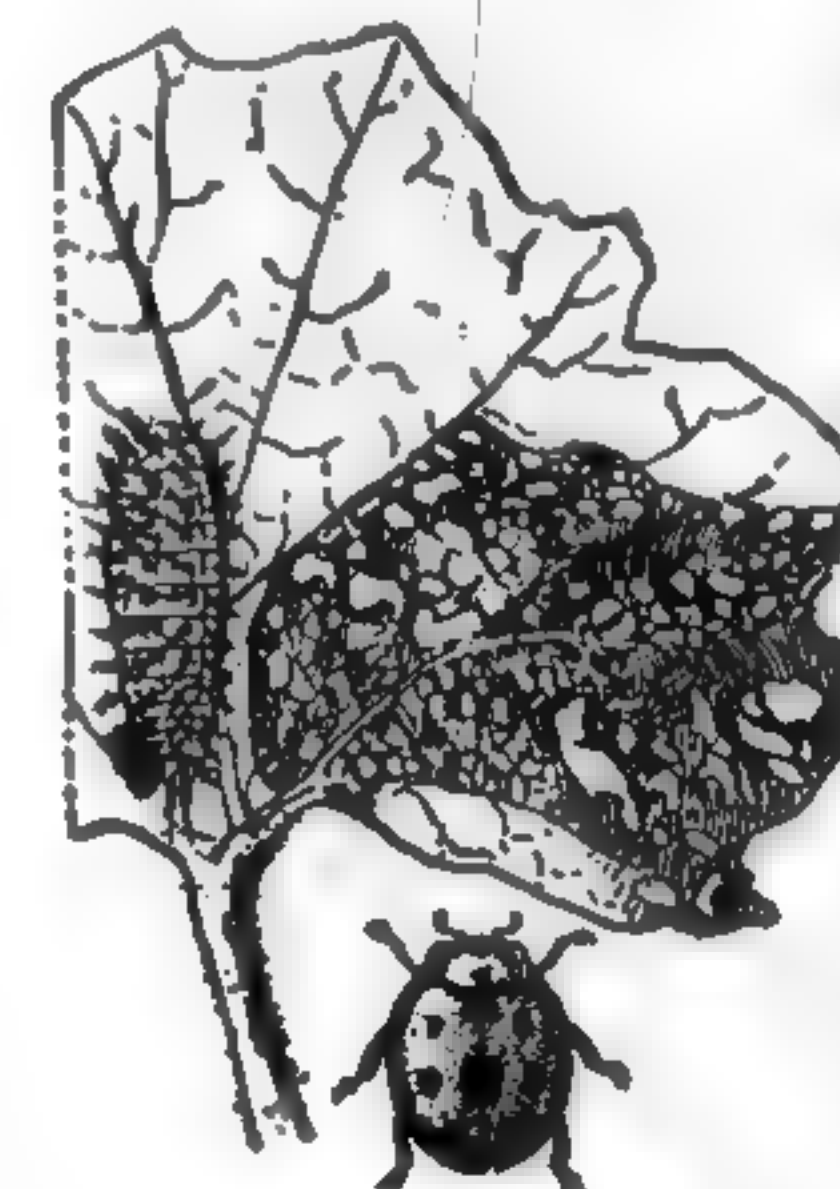


Squash Bug or Stink Bug

the egg clusters may be gathered by hand.

Squash Lady Beetle: Adults and larvae feed upon the leaves. Spray with lead arsenate.

Squash-vine Borer: Larvae tunnel in the stem near its base, causing decay. Cut slits lengthwise in the stem and kill the borers. Cover the joints of the vine with earth and new roots will be formed to support the plant. Grow a few early plants for traps; when well infested, destroy them. Plant the main crop rather late. Spray basal 4 ft. of vine covering all stems and under sides of the leaves with nicotine solution (1-100), four applications at weekly intervals in July to destroy the eggs.



Squash Lady Beetle

Striped Cucumber Beetle: See Cucumber.

STRAWBERRY Strawberry Crown Borer: Grub



Squash-vine Borer

feeds in the crown of the plant. Practice crop rotation. Burn over infested field in Fall.

Strawberry Flea Beetle: Eats round holes through the leaves. Spray with lead arsenate.

Strawberry Leaf Roller: Larvae roll leaf and feed inside. Spray with lead arsenate. In bad infestations burn over fields as soon as crop is harvested.

Strawberry Root Aphid: Sucks sap from leaves and roots, killing plants. Spray with nicotine solution. Set clean plants on land not infested.

Strawberry Sawfly: Larvae devour the leaves. Spray with lead arsenate or Hellebore.

Strawberry Weevil: The females of this small snout beetle cut off the blossom buds of staminate varieties when ovipositing. Plant pistillate varieties in part. Spray with lead arsenate.

Strawberry Whitefly: Sucks sap from the underside of the leaves. Underspray with soap and nicotine solution or dust heavily with nicotine dust. Burn over infested fields in Fall.

White Grubs: See Grass.

SWEET PEAS

Pea Aphid: See Pea.

SWEET POTATO

Tortoise Shell Beetles: Feed upon leaves. Spray with lead arsenate.

TOBACCO

Cutworms: See Tomato.

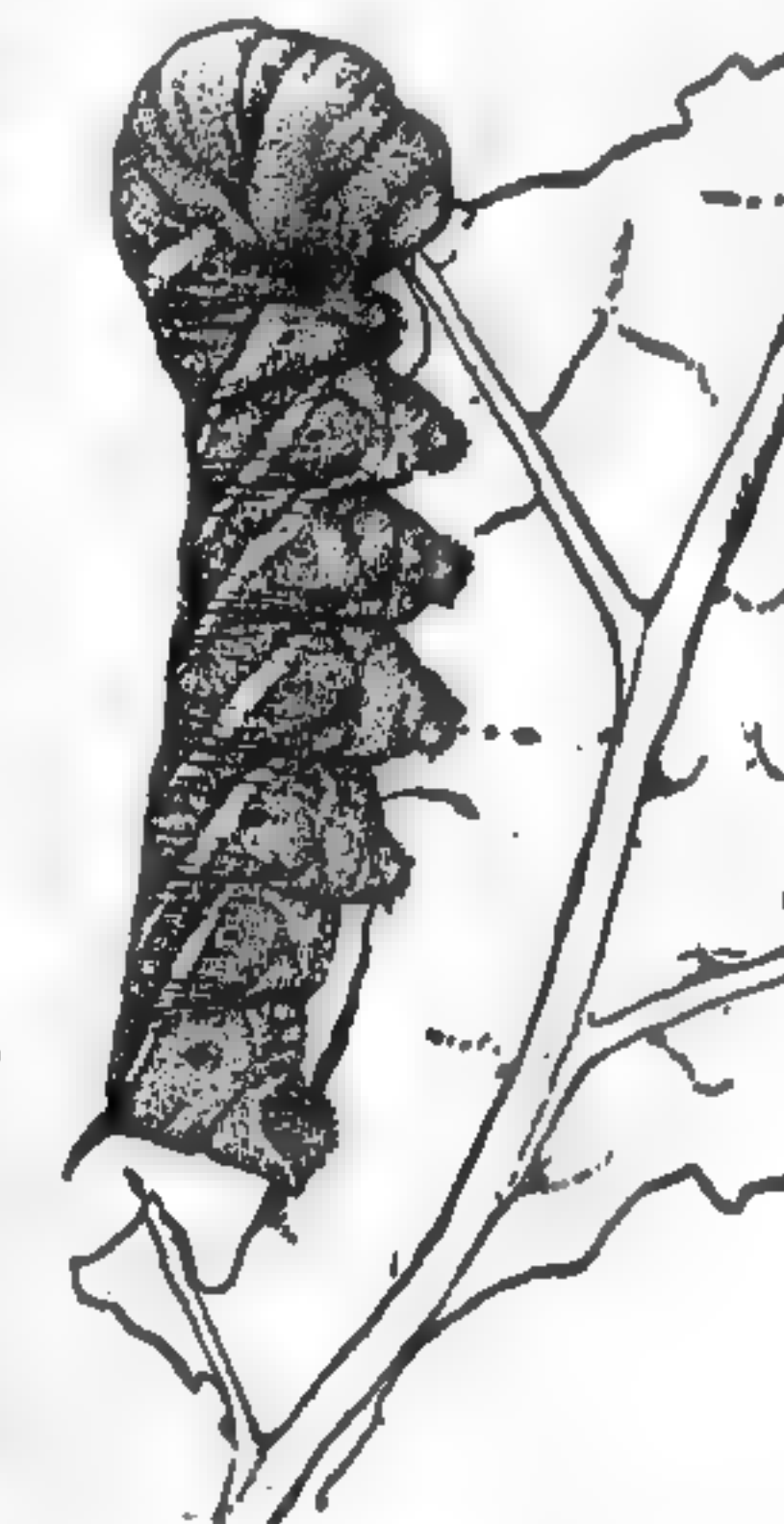
Grasshoppers: Several species of grasshoppers eat holes in the leaves, particularly around the margins of the field. Spray with lead arsenate or distribute poisoned bran mash.

Potato Flea Beetle: Eats holes through the leaves. Spray upper and under leaf surfaces heavily with lead arsenate. See Potato.

Thrips: Several species of thrips occasionally injure tobacco. Spray with nicotine solution or pyrethrum soap.

Tobacco or Tomato Horn Worms: Large, green caterpillars with horn on the tail devour the leaves. Practice hand picking. Spray with lead arsenate.

Wireworms: Wireworms are the larvae of click



Horn Worm—Affects both Tomato and Tobacco

beetles and are slender, glossy, yellow worms that tunnel in the main stem below the surface of the ground. There are many species and from two to six years are required to complete their lifecycle. Do not plant on infested land. The pest may be controlled by planting Corn or Beans in every fifth row and after the plants become infested treat by drilling "cyanogas" into the soil close to the plants. The fumes will kill the wireworms as well as the plants and after waiting a few days it is safe to set the tobacco plants.

TOMATO

Cutworms: Eat off the stems of the plants near the ground; certain species climb the plants and eat the leaves. Scatter poisoned bran mash around the field just at night so that the cutworms may have a chance to get it before it dries.

Greenhouse Whitefly: Immature insects suck the sap from the undersides of the leaves. Underspray with soap and water or pyrethrum soap. Fumigate greenhouses and frames with hydrocyanic acid gas.

Potato Flea Beetles: See Potato.

Stalk Borer: See Dahlia.

Tomato or Tobacco Hornworms: See Tobacco.

TULIP

Bulb Mite: See Greenhouse Whitefly Narcissus.

Garden Millipede: Hordes of millipedes eat into the bulbs in old Tulip beds, often destroying them. Reset bulbs each year. Some of the millipedes may be killed by distributing around the beds slices of Potato or Turnip dipped in white arsenic or lead arsenate and water.



Tulip Tree Scale

TULIP TREE

Tulip Tree Scale: Large, brown, hemispherical scales on bark of lower branches sucking the sap. Spray with lime-sulphur or miscible oil in Fall or early Spring.

TURNIP

Cabbage Root Maggot: See Cabbage.

Cutworms: See Tomato.

Turnip Aphid: Green aphids on underside of leaves sucking the sap. Underspray with soap and water or nicotine solution or dust heavily on a warm day with nicotine dust.

VIOLET

Eelworms: Infest the roots, forming galls. Plant in new soil or sterilize old soil by steam. Add plenty of air-slaked lime to the soil.

Garden Slugs: See Lettuce.

Violet Gall Midge: Larvae or maggots live in the curled margins of leaves. Fumigate every other night until galls disappear, using hydrocyanic acid gas ($\frac{1}{2}$ oz. to 1000 cubic feet) with an exposure of not less than two hours.

Violet Sawfly: Larvae devour leaves. Spray with lead arsenate or Hellebore.

WALNUT

Walnut Caterpillar: Clusters of black caterpillars covered with whitish hairs strip the branches and finally the tree in August. Spray with lead arsenate. Clip off twigs when caterpillars are small, and kill by crushing.

Walnut Weevil or Curculio: Adults feed at base of leaf stems; larvae tunnel in new shoots and infest the fruit of Persian and Japanese Walnuts. Spray with lead arsenate.

WILLOW

Aphids: Large, reddish aphids congregate on twigs in Fall and suck the sap. Spray with kerosene emulsion or nicotine solution.

Imported Willow Leaf Beetle: Beetles and grubs both feed on leaves of smooth-leaved species, skeletonizing them. Spray with lead arsenate.

Oyster-shell Scale: See Apple.

Poplar and Willow Curculio: See Poplar.

Poplar Tent Maker: See Poplar.

Satin Moth: See Poplar.

Spiny Elm Caterpillar: See Elm.

WISTERIA

Silver-spotted Skipper: See Locust.

ZINNIA

Stalk Borer: See Dahlia.

It will not be out of order to add just a few words in regard to the enemies treated in this chapter. The main method for controlling them is to prevent them by the strictest sanitation. All diseased or insect-infested parts must be burned;



A sucking insect—note the formidable beak used to pierce plants and extract juices

Head of biting insect—note jaws, large compound eyes, and the feelers near jaws and eyes

such stock must never be planted in your clean garden or allowed to remain there if it has already started. Land which is known to be infested with various pests must be avoided.

Keep down weeds which harbor diseases and insects. A method which must not be scorned is hand picking when possible. Anything which contributes toward the best culture of the

plant will be found a control for the enemies as well. If you have questions as to just how to control any of the various maladies, consult your seedsman, florist or nurseryman, but do not lose time—insects and diseases work quickly.

The gardener should become familiar with the ways of the insects, for some are valuable and should be admired. Those who have read Sir John Lubbock, Fabre or Maeterlinck realize that the insect world is quite as romantic as our own.

Plants become yellow not only as a result of insect injury or disease, but also when they get too much water or too little or when the soil is too poor or too rich. Be sure of the cause before you try to cure the trouble.



The upper figure shows an ordinary brass garden syringe. Be sure to buy a good article to begin with; it pays. The lower figure shows a brass vaporizing sprayer. This is just what is needed for applying liquid insecticides and fungicides

Chapter XXX

DISEASES OF GARDEN PLANTS AND THEIR CONTROL

By H. H. WHETZEL, Professor of Plant Pathology, Cornell University, Ithaca, N. Y.

Plant Disease Specialists—Causes of Diseases—Control of Diseases—Books on Plant Diseases—Some Common Diseases of Garden Plants and How to Treat Them—Spray Materials

NOWHERE are diseases in plants so important and troublesome as in the garden. To the home gardener every plant is an individual, not merely a part of the crop. The individuals of any one kind are often few, and a sick or dying plant becomes a catastrophe. The farmer may lose 25 per cent of his Oats from smut, or 50 per cent of his Potato crop from blight, and scarcely realize it; but what gardener can regard with equanimity one of his choice Asters affected with "yellows," the pods of his string Beans spotted by the anthracnose, or the blasting of his favorite clump of Lilies by the mosaic disease. How discouraging to watch the spotting and blighting of the foliage on the Tomatoes you have so carefully staked and cultivated, or the dying of your Cucumber vines with wilt. No other factor in successful gardening is so important as the control of diseases and pests. The selection and purchase of choice seed, proper preparation and fertilizing of the soil, cultivation and weeding, all these are to little purpose if fungi and insects are allowed to destroy the fruits of one's labor. For the average gardener diseases are the most puzzling, troublesome and discouraging of his many problems. Fortunately, the cost of controlling these diseases and pests is the least expensive of all the operations of gardening.

Success in the prevention of serious losses from diseases and pests depends upon a reasonable knowledge of the nature and causes of plant maladies, familiarity with the symptoms of the more common ones, and some experience with the standard methods for their control. Few gardeners, however, can hope to become expert plant doctors.

Treating plants for the prevention of disease is a highly technical job. The wise gardener will avail himself of the professional advice and assistance of plant pathologists. There is one or more in every State Experiment Station.

Among the plant pathologists of this country are specialists on certain groups of diseases in plants, just as there are specialists in human ailments. These men are ever ready to give of their knowledge and experience in helping the gardener with his disease problems. Learn who and where these experts are; send them specimens of diseased plants and write for advice. When sending sick plants to the plant doctor, certain important things should not be forgotten. When possible, send the entire plant, root and top, carefully wrapped and packed to reach him in the best condition possible. Write him fully, describing the symptoms of the trouble as you have observed them and do not fail to send more material if he requests it. Do not be disappointed if he cannot diagnose the trouble every time. We know relatively little as yet about the many diseases which afflict garden plants. Even when we know the name of the disease we shall often have to admit that we do not know how to control it.

PLANT DISEASE SPECIALISTS

A list of these plant disease specialists may be of service. I am sure that any of those listed below will be glad to render every service they can.

- Dr. J. F. Adams, Agr. Exp. Station, Newark, Delaware.
Diseases of Melons, Tomatoes, Sweet Potatoes and Sweet Corn.
- Dr. H. W. Anderson, Agr. Exp. Station, Urbana, Illinois.
Diseases of fruits and fruit trees.
- Dr. M. F. Barrus, Cornell University, Ithaca, New York.
Diseases of Beans and Potatoes.
- Dr. H. P. Barss, Agr. Exp. Station, Corvallis, Oregon.
Disease of Onions and other garden crops.
- Dr. W. S. Beach, State College, Pa.
Disease of Rhubarb, Lettuce, Lima Beans, and Mushrooms.
- Dr. Chas. Chupp, Cornell University, Ithaca, New York.
Diseases of Cabbage, Potatoes and other vegetables.
- Dr. G. P. Clinton, Agr. Exp. Station, New Haven, Conn.
Diseases of garden vegetables and flowers.
- Dr. S. P. Doolittle, University of Wisconsin, Madison, Wis.
Diseases of Cucumbers and Melons.

- Dr. H. W. Dye, Niagara Sprayer and Chemical Co., Middleport, New York.
Diseases of Celery, Potatoes, Lettuce and Onions.
- Dr. C. W. Edgerton, Agr. Exp. Station, Baton Rouge, La.
Diseases of Eggplants, Tomatoes, Potatoes, etc.
- Dr. H. S. Fawcett, Citrus Exp. Station, Riverside, Cal.
Diseases of citrus fruits.
- Dr. Donald Folsom, Agr. Exp. Station, Orono, Maine.
Diseases of Potatoes.
- Dr. Max Gardener, College of Agriculture, Berkeley, Cal.
Diseases of Tomatoes, Cucumbers and other vegetables.
- Mr. C. E. Guterman, Cornell University, Ithaca, New York.
Diseases of Lilies, Asters, Tulips, and ornamental perennials.
- Dr. L. L. Harter, Bureau of Plant Industry, U. S. D. A., Washington, D. C.
Diseases of Sweet Potatoes, Eggplants and Spinach.
- Dr. B. B. Higgins, Agr. Exp. Station, Experiment, Ga.
Diseases of Eggplants, Peppers, and other southern garden crops.
- Dr. F. R. Jones, Agr. Exp. Station, Madison, Wis.
Diseases of Peas and other legumes.
- Dr. G. W. Keitt, Agr. Exp. Station, Madison, Wis.
Diseases of Apples and Cherries.
- Dr. L. M. Massey, Cornell University, Ithaca, New York.
Diseases of Gladiolus, Roses, Cyclamen, and other ornamentals.
- Dr. Frank P. McWhorter, Agr. Exp. Station, Corvallis, Oregon.
Diseases of Tomatoes, Spinach, Lettuce, Beans, Narcissus, etc.
- Dr. I. E. Melhus, Agr. Exp. Station, Ames, Iowa.
Diseases of Potatoes, Onions, etc.
- Dr. W. D. Mills, Cornell University, Ithaca, New York.
Diseases of fruit.
- Dr. John Monteith, U. S. D. A., Washington, D. C.
Diseases of lawn and turf.
- Dr. A. G. Newhall, Cornell University, Ithaca, New York.
Diseases of vegetables; nematodes; soil sterilization.
- Dr. C. R. Orton, Agr. Exp. Station, Morgantown, W. Va.
Seed and seed bed disinfestation.
- Dr. W. H. Rankin, Agr. Exp. Station, Geneva, New York.
Diseases of Raspberries and shade trees.
- Dr. J. J. Taubenhause, College Station, Texas.
Diseases of Onions, Sweet Peas, Sweet Potatoes, etc.
- Dr. A. B. Burrell, Cornell University, Ithaca, New York.
Diseases of fruit trees.
- Dr. J. C. Walker, Agr. Exp. Station, Madison, Wis.
Diseases of Onions, Cabbage and Cucumbers.
- Dr. G. F. Weber, Agr. Exp. Station, Gainesville, Florida.
Diseases of citrus and southern truck crops.
- Dr. D. S. Welch, Cornell University, Ithaca, New York.
Diseases of shade trees and shrubs.
- Dr. R. P. White, Agr. Exp. Sta., New Brunswick, N. J.
Diseases of ornamental plants.

The writer himself will be glad to answer inquiries about diseases in the garden, especially of Peonies, Iris, Snapdragon, Ginseng and Goldenseal, as well as questions on dusts and dusting.

CAUSES OF DISEASES

In order that the gardener may understand the information and intelligently apply the recommendations of the plant doctor, he must have a working knowledge of the causes of plant diseases.

Most diseases of plants are caused by fungi and bacteria and viruses. These are for the most part very minute, usually microscopic plants, which live as parasites on flowers and vegetables. In taking food from their hosts, these parasites excrete poisons that cause the injurious processes which we call diseases. The diseased plant is spoken of as the *suscept*; the causal organism is called the *pathogene*.

Bacterial pathogenes are all microscopic. If one's eyes possessed the power of magnifying these bacteria some 4000 diameters they would appear as large as Peas or earthworms and of about that shape. One would see that they consist of a mass of clear jellylike living substance enclosed in a tough membrane which yields to pressure like a rubber ball. Such, for example, would be the bacterial pathogene which causes soft rot of Iris, Turnips and Carrots, the fire blight of Pears, Apples and Quinces, the wilt of Cucumbers and Melons, or the scab of Potatoes. These bacteria are carried from diseased to healthy plants by sucking insects, or they are splashed by raindrops on the leaves, and find their way into the plant through natural openings, such as stomates and water pores. Once inside the tissues the bacteria multiply rapidly, by simple division, and, spreading through the spaces between the cells, excrete toxins which kill the tissues or stimulate the growth of tumors, as in the crown gall disease of the roots of fruit trees and Raspberries. The bacteria which cause plant diseases look just like those which cause diseases in men and animals. No bacterial plant pathogenes, however, are known to be pathogenic to man.

There are relatively few diseases of plants caused by bacteria. *Fungi* are by far the more common plant pathogenes. Fungous pathogenes consist of a much branched tubular structure, the *mycelium*, in which the living jellylike protoplasm is enclosed. This mycelium is usually divided by cross walls or *septa* into many cells. It ramifies through the *suscept*'s tissues in search of food, excreting toxins which, as in the case of the bacteria, may kill, stunt or stimulate the plant to overgrowth. Fungi reproduce themselves by spores. Fungous spores are of many

shapes, sizes and colors and are borne free on the mycelium or enclosed in a fruit body of some sort. Until one has examined the spores of many fungi under the microscope he can have no idea of the variety and immense numbers of these minute bodies produced by the fungi for purposes of reproduction. Spores are to the fungi what seeds are to green plants. Crush one of the smut boils which is usually to be found on some of the stalks in a patch of Sweet Corn. The black powdery mass is composed almost wholly of spores, each about one-twenty-five-hundredth ($\frac{1}{2500}$) of an inch in diameter.

The spores of fungous pathogenes are carried to healthy plants by the wind, splashing rain, or running water; by insects, on their legs or mouth parts, when visiting plants for food; by the gardener when weeding, harvesting, or otherwise handling plants; or by birds, cats, rabbits or other animals running through the garden. Those spores which find themselves on leaf, flower, fruit or other part of the suspect, germinate in drops of rain or dew or in the sap of wounded tissue. They send forth a germ tube (sprout) which may penetrate directly through the unbroken skin of the leaf or fruit, or enter through stomates, nectaries, or wounds, giving rise to a ramifying mycelium and so infecting the suspect.

Thus certain spores of the Apple scab fungus produced in the overwintered old leaves on the ground, are discharged into the cool, moist air during Spring rains and carried to the opening buds. Here they invade the tender young leaves and flowers, causing the dark blotches of the scab disease, so familiar to everyone on the fruits, but which are less frequently observed on the foliage. The Bean anthracnose fungus, harbored within the seed, produces dark brown lesions on the cotyledons of the seedling bean. Here millions of microscopic spores are formed. The falling raindrops splash these spores upon the stalks and leaves of the growing plant. Here they germinate, their germ tubes penetrating the tender epidermis. New lesions are formed and a new crop of spores supplies inoculum for the young pods; result, spotted pods when the gardener goes to pick the Beans.

There are other kinds of pathogenes besides bacteria and fungi. *Nematodes*, minute microscopic worms, also cause serious diseases of our garden plants. The root gall nematode, especially in the South, or in greenhouse benches, often causes severe damage to such crops as Cucumbers, Tomatoes, Potatoes, and many other plants. In fact, this nematode is known to infest over 400 different kinds of plants. Another infests Sugar Beets and another the roots of citrus trees.

There is still another group of pathogenes, commonly spoken of as *viruses*, which, in recent years, have attracted much attention on account of their mysterious nature and the large number of serious diseases of plants caused by them. The diseases they produce are commonly spoken of as virus diseases. Of these the most numerous are the mosaic diseases. A peculiar light and dark green mottling of the foliage of affected plants is the characteristic symptom of these maladies. Mosaic of Potatoes, Cucumbers, Tomatoes, Lilies, Lettuce, Beans, Sweet Peas, Cucumbers, Petunias, Raspberries, to mention but a few of the more important, will suffice to indicate the extent to which they affect our cultivated plants. These mosaic diseases usually dwarf their suspects and reduce their productivity often to a very serious extent.

Then there are other virus diseases, such as the yellows of Asters, the leaf roll, spindling tuber and yellow dwarf of Potatoes, Peach yellows, little Peach and Peach rosette, streak of Tomatoes and Potatoes, curly top of Beets and bunchy top of Bananas.

These virus diseases are caused by pathogenes the nature of which is unknown. They are generally held to be ultra microscopic. In most cases the virus pathogene is transmitted by sucking insects, occasionally by biting insects. Aphides and leaf hoppers are most frequently the carriers. The gardener may transmit some of them in handling his plants.

CONTROL OF DISEASES

There are four fundamental principles to guide us in deciding upon the method of control to be applied in any case. They are expressed by the words: exclusion, eradication, protection and immunization.

Restricting ourselves to the garden, these terms may be explained as follows:

Exclusion involves the use of any method by which a pathogene is prevented from getting into the garden and establishing itself there. One of the commonest ways in which bacterial and fungous pathogenes find their way into the garden is on, in or with the seed of their suspects. It is clear, then, that seed disinfection may be a very useful measure in excluding dangerous fungi or bacteria from our garden. There is, however, no one seed disinfectant which the gardener may apply in general to all seed. Seed disinfection requires definite knowledge of the pathogene to be killed, the right kind of disinfectant to use, and exact and careful application as to strength and time of treatment to avoid injury to the seed itself. The more common seed disinfectants

are formalin, mercuric chloride, chlorophenol mercury, copper carbonate, copper oxide and hot water. The gardener should always consult his plant doctor and follow his directions explicitly with respect to seed treatments. Transplants, sets, bulbs and seedlings very frequently harbor dangerous pathogenes. Great care should be exercised to discard before planting any diseased individuals. Such plants will not only themselves be worthless, but will also serve as sources of inoculum for their healthy neighbors.

Eradication involves the destruction or removal of diseased plants from the garden. Sanitary methods of all kinds are eradication measures. The good gardener will inspect his plants frequently, carefully removing and destroying sick plants, spotted leaves or dying branches. One can seldom expect to completely eradicate a pathogene once it is established in the garden, but by prompt removal of diseased plants, spread of the disease may be checked. Rotation is a good eradictory measure and may be practiced even in a small garden. Many pathogenes are harbored in the debris of diseased plants in the soil. They die out, however, if their particular suscept is not planted in the same place the next year. Sweet Peas, Tomatoes, and other annuals should never be planted in the same place year after year. Change them about and starve out their pathogenes.

Protection is the most generally applicable principle of control of diseases in the garden. The application of protectants, such as sprays or dusts, to shield plants from the attacks of fungi or insects, is usually very effective if one knows just what protectant to use, and just when to apply it. Here, again, the advice of the plant doctor of long experience is necessary for success.

The standard protectants against fungous pathogenes are copper and sulphur in some form. While it has generally been recommended to apply these in liquid form as sprays, their use in dust form is now preferable for many reasons. Copper-lime dust can be used wherever bordeaux mixture spray has been recommended heretofore. It is identical with bordeaux except for the water which, in the case of the dust, is supplied by the dew on the leaves. When dusting with copper-lime, always make the applications very early in the morning or late at night. Finely ground dusting sulphur is effective where lime-sulphur spray has been recommended. Kolodust, a sulphur dust containing 10 to 20 per cent of colloidal sulphur, is preferable to any of the finely ground or precipitated sulphurs as it is more toxic to the fungi and more adhesive to the foliage. Kolodust stained green (Green Kolo-

dust) will not show on the foliage and is even more effective than the yellow form of sulphur. A 3 per cent nicotine dust should be kept on hand for aphides and leaf hoppers. For biting or chewing insects any of these fungicidal dusts containing arsenate of lead may be had. A good duster gun, which is carried by straps over the shoulders, with a fan operated by hand, is most satisfactory for the average garden. There are several good types of these to be had at from \$15 to \$20. If properly cared for they will last for many years. The dusts should be purchased in cans.

In general, copper-lime dust should be used on Potatoes, Tomatoes, Strawberries, Beans and Celery. Sulphur dust is generally effective against the fungous pathogenes of Apples, Peaches, Cherries, Roses, Hollyhocks, Asters, and most garden flowers. For fungous diseases always apply the dust *just before it rains*, not directly after. Fungi are usually disseminated and invade the plants *during* the rain period. The protectant must therefore be on the plant when the rain comes.

Immunization involves the development of disease resistant or immune varieties by selection and breeding. The most the average gardener can do along this line is to obtain such immune or resistant varieties, when possible, from those who produce them. There are relatively few such varieties of garden plants which are satisfactory. However, one may now obtain wilt resistant Asters and anthracnose resistant Beans for example.

BOOKS ON PLANT DISEASES

For the gardener who really wishes to learn something about the diseases of his plants and the methods commonly employed in their control, the following books will be found most helpful.

MANUAL OF VEGETABLE GARDEN DISEASES. Chas. Chupp.
The Macmillan Co., New York. 1925.

MANUAL OF PLANT DISEASES. F. D. Hcald.
McGraw-Hill Book Co., Inc., New York. 1926.

CITRUS DISEASES AND THEIR CONTROL. H. S. Fawcett and H. A. Lee.
McGraw-Hill Book Co., Inc., New York. 1926.

MANUAL OF FRUIT DISEASES. L. R. Hesler and H. H. Whetzel.
The Macmillan Co., New York, N. Y. 1917.

INSECTS AND DISEASES OF ORNAMENTAL TREES AND SHRUBS. E. P. Felt and W. H. Rankin
The Macmillan Co., New York, N. Y. 1932.

SOME COMMON DISEASES OF GARDEN PLANTS*

*The names given at the end of the notes on each disease are those of pathologists to whom to write for more specific information. Their addresses will be found on pages 433 and 434. See page 445 for tables and explanations of formulae.

APPLE

Scab. A fungous disease; dark olivaceous blotches on leaves and black scab spots on the fruit. Dust with sulphur or spray with lime sulphur, beginning as soon as the buds show green leaf tips, and repeat just ahead of each rain period up to and including the petal fall or later, especially in the Southern Apple belt. Where insects, like leaf roller or codling moth are to be controlled, add arsenate of lead. *Burrell, Keitt, Mills, Anderson.*

Bitter rot. A fungous disease of the Southern Apple section. Causes brown rotten spots on the fruit and cankers on the limbs. Develops during late Summer. Remove and destroy mummied Apples, also any infected fruits discovered during June and July. Spray with bordeaux mixture, 3-5-50, beginning 4 to 5 weeks after petal fall, and repeat every two or three weeks until three or four applications have been made. *Anderson, Orion.*

Blotch. A fungous disease of the Southern Apple sections. Causes minute gray spots on the leaves, a superficial blotching and cracking of the fruit and scurfy cankers on the twigs and limbs. Apply bordeaux 4-6-50, 2, 4 and 6 weeks after petal fall. Lime sulphur may be used for the first applications if one fears russetting of the fruit from bordeaux. Thoroughness of application is very important. Prune or cut out cankers, especially from young trees. Thorough removal of cankers will largely reduce necessity of spraying. *Anderson.*

Rust. A fungous disease which requires the proximity of red Cedars for its perpetuation. Causes yellow spots on leaves, resulting in early defoliation. Similar spots also occur on the fruits. The only satisfactory control is removal of Cedars for a mile or two about the Apple trees. *Mills.*

Collar rot and Root rot. Caused by Winter injury, fire blight or a *Xylaria* fungus. Remove diseased bark and bridge graft or approach graft. *Whetzel.*

Fire blight. A bacterial disease which also attacks Pears and Quinces. Causes blighting of blossoms, growing twigs and water sprout. Canker in the bark of limbs or body of the tree are formed about the base of blighted spurs or water sprouts. Break out blighted blossom spurs as soon as discovered. Cut out blighted twigs and disinfect cut with corrosive sublimate 1-1000. Cut out cankers in Autumn or early Spring, as they are the sources of inoculum. Disinfect with corrosive sublimate and paint wounds with gas tar. *Whetzel, Keitt.*

ASTERS

Yellows. A virus disease transmitted by leaf hoppers. Affected plants are dwarfed, of a pale green or white color. Flowers dwarfed and fail to color. Remove diseased plants as soon as discovered. Dust plants frequently from the time they set out with strong nicotine dust to keep off leaf hoppers. Asters planted along frequented paths, or about entrance to the house, are seldom affected, as the leaf hoppers are wild and do not frequent such plants. *Guterman.*

Stem rot or Wilt. Caused by fungi, either *Fusarium* or *Botrytis*. Affected plants wilt suddenly and show dead brown areas in the bark of the stem, usually near the base. Remove diseased plants promptly. Use seed of wilt resistant varieties. *Whetzel.*

Rust. A fungous disease causing small yellow specks on the underside of the leaves which, in severe cases, turn brown and die. Dust the plants frequently with sulphur. *Whetzel, Guterman.*

BEANS

Anthraxnose or Pod spot. A fungous disease. Linear dark brown lesions are produced along the leaf veins on the underside. Large circular black cankerlike spots develop on the pods about the time they are full grown. The pathogene is carried over from one season to the next in the seed. Since unspotted pods contain fungus-free seed, the simplest control is to leave part of a row to mature and then select only spot free pods for seeds for the following year. Then inspect seedlings as they grow and pull up all anthracnose affected plants. Avoid handling plants when wet as the spores of the fungus are thus carried to healthy plants. Thorough dusting with copper lime dust may hold the disease in check. Plant resistant varieties. *Barrus.*

Blight. A bacterial disease causing large dead areas in the leaves and reddish water-soaked spots on the pods. A seed-borne pathogene. No very satisfactory method of control. *Barrus.*

BEETS

Leaf spot. A fungous disease causing circular dead spots in the leaves, usually with a reddish border. Dusting with copper lime dust is very effective. Begin dusting before spots appear. *Chupp.*

BLACKBERRIES

Orange rust. Affected plants are dwarfed and show bright orange masses of powdery spores on the underside of the leaves. The

fungus infests the entire plant, wintering over in the roots. Dig up and destroy diseased plants. *Clinton, Whetzel.*

CABBAGE

Aphis Leaf Curl. Affected plants have the leaves puffed and distorted, covered with masses of bluish green plant lice. Dust heavily with nicotine dust during heat of the day.

Black leg. A fungous disease causing oval depressed light brown cankers near the base of the stalk. Dead spots containing minute black fruit bodies often appear in the leaves. Badly diseased plants may wilt or fall over as a result of the rotting of the stem. The fungus attacks the seed pods and infects the seed. The seed should be disinfected by suspending in cheesecloth bags in a 1-1000 solution of corrosive sublimate for 20 to 30 minutes, after which the seed is rinsed in clean water and spread out to dry or planted at once. As the fungus may persist in the soil for some time a three-year rotation should be practiced. *Chupp, Walker.*

Black rot. A bacterial disease. The symptoms of this disease are dying papery V-shaped areas about the edge of the leaves in which the veins are blackened. Affected leaves soon drop, often leaving only a tuft of leaves at the top of a bare stalk. A soft rot frequently follows black rot infection. The bacteria are carried into the garden on the seed, or remain in the soil in the debris of diseased plants. They enter the leaves through the water pores in the cotyledons or older leaves. Treat seed with corrosive sublimate as for black leg. *Chupp, Walker.*

Club root. This disease is caused by a fungus which attacks the roots by way of the root hairs, causing extraordinary swelling of the roots. Affected plants are usually dwarfed and wilt during the heat of the day. Infection usually occurs in the seed bed, but healthy seedlings may become affected after they are set out. The pathogene is not seed-borne. The spores remain viable in the soil for many years. If the garden soil becomes infested, apply lime, 10 to 25 lbs. per 100 sq. ft. If seedlings are purchased for planting, examine the roots carefully for club root swellings and discard all the plants if any affected ones are found. *Chupp.*

Yellows. A fungous disease which attacks the roots and causes a rotting of the base of the stalk. The leaves turn yellow and drop off. Badly affected young plants often wilt and die. The only satisfactory method of control is the use of yellows resistant varieties. *Chupp, Walker.*

CAULIFLOWER

The diseases of Cauliflower are the same as those of Cabbage, which see.

CARNATIONS

Stem rot. Caused by a soil-harbored fungus which attacks the base of the stem

both outdoors and in the greenhouse. Affected plants become pale, cease growing, and finally wilt and die. No very satisfactory method of control is known. Remove diseased plants with the soil about them. Do not plant too deeply. Avoid overwatering. *Massey.*

Rust. A fungous disease, characterized by brown blisterlike bodies on leaves and stems. Dust the plants frequently with sulphur. Avoid planting of especially susceptible varieties.

CELERY

Late blight. A fungous disease, causing dead brown spots, showing numerous minute black fruit bodies on leaves and petioles. Badly effective leaves turn brown and die. The pathogene is seed-borne or winters over in the debris of disease plants in the soil. Dust with copper lime dust, beginning as soon as the plants are well up in the seed bed. Continue dusting every week or ten days after the plants are set out. *Dye, Newhall.*

Early blight. A fungous disease causing small yellowish spots which rapidly enlarge to form ashen-gray, dead papery areas in the leaf. Usually not appearing until plants are six weeks old. In moist weather the spots become covered with an ashen gray mold. Control same as for late blight. *Dye, Newhall.*

Bacterial blight. A bacterial disease causing spotting of the foliage. Spots at first yellow then becoming brown. Often confused with late blight, but spots showing no black fruit bodies. Dust with copper lime dust as for late blight. *Newhall, Dye.*

Pink rot. A fungous disease causing a soft watery pink rot of leaves and petioles, especially in storage or transit. Affected plants are covered with a dense white cottony mycelium in which the large black sclerotia of the fungus are formed. Thoroughly dusted plants suffer less from this disease. Avoid too much moisture in storage. *Newhall, Dye.*

SWEET CORN

Smut. A fungous disease causing large, black spongy boils on stalks, leaves, ears and tassels. The fungus passes the Winter on the soil or in manure. Remove and destroy smut balls. If the disease is serious, year after year, dust the plants when young up to tasseling time with copper lime dust.

Bacterial Wilt. This is commonly known as Stewart's disease. The bacteria invade the sap tubes of the Corn plant causing a stunting and wilting of the plant. The plants appear as if frosted. On cutting the stalk near the base, a slimy yellow ooze can be squeezed from the cut ends. Ask your seedsmen for F₁ generation seed. *Chupp.*

CHERRIES

Brown rot. A fungous disease also affecting Peaches, causing a brown rot of the ripening fruit. The rotted fruits are soon covered

by the gray spore tufts of the fungus. The diseased fruit dies to form a hard black mummy which falls to the ground or hangs on the tree through the Winter. Dust with sulphur, beginning about the time the fruits begin to color; repeat just before picking. Serious only in rainy season. *Whetzel, Mills.*

Leaf spot. A fungous disease causing minute purple specks on the leaves which enlarge to form small dead spots. Affected leaves turn yellow and fall prematurely. Dust with sulphur or copper lime dust, beginning about the time the shucks fall from the green fruit. Two to four applications—the last just after picking the fruit—will usually control the disease. *Whetzel, Mills.*

CUCUMBERS

Bacterial wilt. Caused by bacteria which are carried over Winter in the striped Cucumber beetle which introduces the pathogene into wounds made in feeding. The bacteria multiply in the sap vessels of the vine, causing it to wilt. Dust the young plants frequently with nicotine dust or copper lime dust to keep away the beetles. Remove and destroy wilted vines as soon as discovered. *Chupp, Doolittle, Gardner.*

Mosaic. A serious virus disease causing mottling and dwarfing of foliage and fruits. Dust frequently with nicotine dust to keep off the insect carriers of the virus. Keep down wild suspects such as wild Cucumber, Milkweed, Pokeberry and Groundcherry in the neighborhood. *Doolittle, Chupp.*

Angular leaf spot. A bacterial disease affecting leaves, stems and fruits. The lesions on the leaves are small, angular, water-soaked spots. The spots on the fruit are smaller and nearly circular. Tearlike drops ooze from the lesions on leaves and fruits. The pathogene is seed-borne. Treat seed with corrosive sublimate 1-1000 for five minutes, rinse in running water and dry. Dust the plants frequently with copper lime dust. *Doolittle, Chupp.*

Leaf spots. There are several fungous leaf spots of Cucumbers which often cause serious injury to the foliage. Regular dusting with copper lime dust is generally effective in holding these in check.

CURRENTS

Leaf curl. Large reddish puffs or malformations are often abundant on the young leaves soon after they unfold. These are caused by an aphid. Spray while buds are still dormant with a 5 per cent tar oil wash. After the leaves are unfolded, dust with nicotine dust, driving it from below against the undersides of the leaves.

Leaf spots. There are at least two serious fungous leaf spot diseases of Currants. These cause early defoliation. Dust the plants several times during the early part of the season with copper lime dust.

DAHLIAS

Mosaic or Yellows. A virus disease causing a dwarfing and yellowing of the plants. No control known. Destroy diseased plants as the tubers are infected and will never produce healthy plants.

DELPHINIUM

Stem rot. Caused by a sclerotial fungus in the soil. Remove diseased plants and the soil for at least a foot about the plant to a depth of 3 or 4 inches. Drench the spot with formalin 1-20, or corrosive sublimate 1-1000. Partially diseased clumps may be cut back and drenched with corrosive sublimate 1-2000. *Guterman.*

EGGPLANTS

Wilt. Caused by a fungus which invades the sap vessels. Affected plants are dwarfed; the leaves finally wilt and die. No satisfactory control known. Remove and destroy affected plants promptly. *McWhorter, Chupp.*

Phomopsis blight. A fungous disease causing a leaf spot of the foliage, cankers on the stems and large brown rotten spots on the fruits. The pathogene is seed-borne. Treat seed with corrosive sublimate, 1-1000 for ten minutes and rinse in running water, dry slightly and plant at once. Dust plants regularly during the growing season with copper lime dust. *Chupp, McWhorter.*

GLADIOLUS

Hard rot. Water-soaked, dark lesions, which later become sunken and black, are formed on the corms, mostly on the lower half. The fungus also attacks the foliage, especially of plants from seed and cormels, to form brown to purplish, irregularly circular spots. Sorting, with the elimination of diseased corms, and a four or five year rotation of crops, combined with proper harvesting and storage of corms will hold the disease in check. *Massey, White.*

Dry rot. Diseased corms usually bear many small lesions, ranging in size from mere dots to areas about one centimeter in diameter. They may be reduced to dry and shriveled mummies by the coalescence of several to many small lesions. Diseased areas are usually less than three millimeters in depth. Recommendations for hard rot, especially crop rotation, should be followed. *Massey, White.*

Neck rot or Scab. The bacteria causing this disease commonly cause the stem to decay at about the ground level. Scablike areas, frequently saucer-shaped and usually covered with a gummy exudate, are formed on the corms. The exudate frequently glues dirt and other material to the corm. Dormant, diseased corms should be treated with formaldehyde (1-120) or corrosive sublimate (1-1000) for from two to seven hours, best at a temperature of 90-100 F. Organic mercury compounds in .5 to 1 per cent strengths may be used in place of the above disinfectants. Practice a four or five year rotation. *Massey, White.*

GRAPES

Black rot. A fungous disease causing the green fruits to rot, turn black and dry up into mummies which fall or cling to the vines during the Winter. Spray the plants heavily with bordeaux or dust with copper lime dust. Make the first application about the time the third leaf is showing on the shoot, again just before the blossoms open, and two or three times later in the season.

Downy mildew. A fungous disease causing large spots on the leaves covered on the lower side by a downy white growth of the pathogene. The fruits are also affected. They turn brown and remain hard. This mildew is controlled by spraying with bordeaux or dusting with copper lime dust.

Powdery mildew. A fungous disease which covers the leaves and young fruits with a thin, powdery white coating of mycelium. The fruits fall prematurely. Dust the plants frequently with sulphur.

IRIS

Leaf spot. A fungous disease causing severe spotting of the foliage which turns brown and dies from the tip downward. Dusting with copper lime dust beginning early in the season should control this disease. *Whetzel.*

Soft rot. A bacterial disease affecting the rhizomes and base of the leaves. The affected tissues become soft and give off a foul odor. This disease can be largely avoided by shallow planting and exposure to the sun by keeping the clumps thinned and well separated. Prized plants may often be saved by cutting out the rotted parts of the rhizome and exposing the cut surface to the sun, so that it dries out rapidly. *Whetzel.*

LILIES

Leaf spot. A fungous disease affecting most varieties of outdoor Lilies. The foliage becomes much spotted and dies. Dust with copper lime dust. *Guterman.*

Mosaic. A very serious virus disease. Affected plants show a pale green mottled foliage, which dies prematurely. The virus invades the bulbs. Plants once infected are worthless and soon die out. The virus is carried by aphides. Dust plants frequently with nicotine dust to keep down aphides. Destroy diseased plants as soon as discovered. *Guterman.*

MELONS

See under Cucumbers.

ONIONS

Blight or Downy mildew. A fungous disease causing large pale areas on the leaves which, in moist weather, become covered with a fuzzy purple growth of the pathogene. The affected leaves die and new leaves are produced. Bladly blighted plants fail to form good bulbs. No satisfactory method of control is known. *Whetzel.*

Smut. Caused by a soil infesting fungus which attacks the very young seedlings, either killing them or forming black powdery pockets in the bulbs. Plants grown from sets are never affected. When drilling in the seed wet the soil with formalin (1 pint to 16 gallons of water). *Walker, Chupp.*

PEAS (SWEET PEAS)

Ascochyta blight. A fungous disease causing a spotting of the foliage and green pods. Dust frequently with copper lime dust. Destroy diseased plants after harvest. Do not allow them to rot on the soil. *Jones, White.*

Root rots. Caused by several different fungi. These diseases are very destructive to both garden and Sweet Peas. Not only the roots but also the base of the stem is rotted. Affected plants grow slowly, then wilt and die. Treat seed with red copper oxide. Avoid planting Peas in the same place year after year. *Chupp.*

Powdery mildew. A fungous disease of both garden and Sweet Peas. Affected plants are covered with a powdery white coating of the mycelium of the pathogene. Frequent dustings with sulphur will control this disease.

PEACHES

Leaf curl. A fungous disease causing a curling of the young leaves. The diseased leaves are usually reddish in color and fall prematurely. Easily controlled by spraying before the buds start to swell in the Spring. Use lime sulphur or dust with copper lime dust or soluble sulphur. *Whetzel.*

Brown rot. Same disease as that affecting Cherries. Controlled by dusting with sulphur, as for Cherries. *Adams.*

PEARS

Fire blight. See under Apples.
Scab. A fungous disease very much like the scab of Apples. Dust frequently throughout the season with sulphur or copper lime.

PEONIES

Botrytis blight. A fungous disease attacking the young shoots as they come up, rotting them off at the surface of the soil. Later in the season the foliage is blighted and the buds rot before they open, especially in wet seasons. Remove all blighted shoots as they appear. In the early Autumn remove soil about crowns and cut away all stems close to the crown. Replace the soil with clean earth or sand and mulch. Dusting with copper lime dust during the growing season should also keep this disease in check. *Whetzel.*

Lemoine disease. A disease of unknown cause. Affected plants are dwarfed, fail to bloom, and the roots are knobby with a swollen ring or cushion on which the bud sits. Affected plants never recover and should be destroyed. *Whetzel.*

Root rots. There are several root rots of Peonies, the cause of which is unknown. Cutting out the diseased portions and allowing the roots to dry for several days before re-planting is the only remedy which can be suggested at present.

PHLOX

Leaf blight. A fungous disease causing minute grayish spots on the leaves which turn brown and die from the base of the stems upward. Dust with copper lime dust, beginning early in the season. *Massey.*

Powdery mildew. A fungous disease. Leaves and stems of affected plants are covered with a dirty white felt of mycelium which soon turns brown and is covered with the minute black fruit bodies. Dust frequently throughout the season with sulphur. *Massey.*

POTATOES

Late blight. A fungous disease; usually appears the latter part of the growing season. Large water-soaked spots develop in the leaves which, with the tops, quickly turn black and die. Tubers rot in the soil or after they are stored. Begin dusting with copper lime or spraying with bordeaux when plants are 4 to 6 inches tall. Repeat every ten days or so throughout the season. Dust or spray just ahead of rain periods. *Chupp, Barrus, Dye.*

Rhizoctoniosis. Poor come-up due to rotting off of young sprouts in the soil. Stem canker at soil level in older plants. Tubers covered with dark brown crustlike sclerotia. Soak seed tubers in corrosive sublimate (1-1000) for 1½ hours. Dry thoroughly. *Chupp.*

Tip burn or Hopper burn. Usually caused by attacks of leaf hopper. Tips and edges of leaves wilt, turn brown and die. Very severe in dry seasons. Dust heavily every week or ten days with copper lime dust or spray with bordeaux mixture. *Chupp.*

Scab. Large scurfy scabs on the tubers. Caused by a soil-inhabiting bacterial pathogene. Treat seed by soaking in corrosive sublimate as for Rhizoctoniosis. Apply sulphur to the soil at the rate of 12 to 18 oz. per 100 sq. ft. before planting. *Chupp.*

SPRAY MATERIALS

The gardener who expects to successfully combat diseases and pests must equip himself with a good duster gun or hand sprayer and a supply of standard fungicides and insecticides. Your seedsman will usually carry a line of such things. The following list will serve as a guide.

Copper-lime dust. 20 parts dehydrated copper sulphate and 80 parts hydrated lime. Part of the lime is often replaced by arsenate of lead for killing eating insects. This is sold under many trade names.

Sulphur dust. There are many brands of finely ground (300 mesh) sulphur on the market. They are of about equal efficiency. A

Leaf roll and Mosaic. Virus diseases. The first is distinguished by an upward rolling of the lower leaflets, a dwarfing of the plants, and in severe cases an upright staring habit. Mosaic is known by a mottling or wrinkling of the leaves and more or less dwarfing. The virus of these diseases is carried in the tubers. Transmitted to healthy plants by insects, chiefly aphides. Plant tubers from fields which have been inspected and certified as safely free from these diseases. *Barrus, Chupp.*

RASPBERRIES

Anthracnose. Purple cankerlike spots on the canes which become whitish gray with age. Remove diseased canes. Spray with bordeaux mixture. *Rankin.*

Mosaic and Leaf curl. Virus diseases transmitted by aphids. Leaves mottled or wrinkled and curled. Destroy diseased plants and replant with plants from disease-free nurseries. *Rankin.*

ROSES

Black spot. Large circular black blotches on upper surface of leaves, which turn yellow and fall prematurely. Fungus winters in old leaves on ground. Clean up fallen leaves. Dust plants frequently during season with sulphur. *Massey.*

Mildew. A fungous pathogene; forms white mealy patches on leaves and young canes. Prune out diseased canes in Spring. Dust frequently during growing season with sulphur. *Massey.*

STRAWBERRIES

Leaf spot. Small white papery dead spots with purple or reddish borders on leaves. Remove all spotted leaves when setting new plants. Dust frequently beginning very early in the Spring with copper lime dust. *Mills.*

TOMATOES

Leaf spot. Several fungi cause leaf spots or blights of Tomato foliage. Thorough and frequent dusting with copper lime dust will hold these in check. *Gardner.*

Mosaic. A virus disease causing a mottling and dwarfing of the foliage. Remove diseased plants promptly and do not prune or handle healthy plants immediately after handling mosaiced ones. *Gardner, Chupp.*

sulphur dust which contains colloidal sulphur is perhaps to be preferred as more effective and adhesive. Sulphur dust containing arsenate of lead should be purchased if eating insects are also to be combatted.

Green Kolo. A sulphur dust stained green is to be preferred where the color of the yellow sulphur on the foliage is objectionable.

Nicotine dust. Hydrated lime impregnated with nicotine sulphate is the standard nicotine dust to destroy aphids, leaf hoppers and other sucking insects which carry the viruses of mosaic diseases.

Mercuric chloride (corrosive sublimate) as sold in tablet form at the drug store is a standard seed disinfectant. The chlorophenol mercuries are now widely used in its stead. These may now be had in dust form for dusting seed instead of soaking them. They are sold under such names as Semesan, Ceresan, etc.

Bordeaux paste. There are many standard brands of Bordeaux, usually in paste form, but some in dry form which when simply, diluted in water are ready to apply. These usually contain arsenate of lead for chewing insects.

Sulphur sprays. For garden spraying get some standard brand or dry mix, i. e., finely ground sulphur containing glue or casein to make it go into suspension in water. This may be had with arsenate of lead in it.

Explanations and Tables

For the home gardener who wants to protect his plants from disease with the least trouble and bother, the seed stores carry proprietary preparations of practically all the standard and recommended fungicides, insecticides and disinfectants. These are obtainable in small quantities and convenient forms and with them detailed, helpful instructions as to their use.

But many will want, not only to know about the various spray materials and how to mix them, but also to do their own preparing. It is for them that the formulae and other details in the foregoing pages, and also the following data, are given:

BORDEAUX MIXTURE (page 440)—This is usually described by giving the amounts of copper sulphate, lime and water in that order, as: 3 (lbs. of Cu SO₄) — 5 (lbs. lime) — 50 (gals. water); or 4-6-50, etc.

CORROSIVE SUBLIMATE 1-1000 (page 440). This dilution (as well as others) can be secured by reference to the following table:

To Make of a Spray	In These Strengths or Dilutions		
	1-400	1-800	1-1000
	Use of the Spray Material		
1 gallon.....	1½ oz.	1/5 oz.	1/3 teaspoonful
3 gallons.....	1 oz.	1/2 oz.	1 teaspoonful
6¼ gallons.....	2 oz.	4 oz.	¾ oz.
12½ gallons (1 pail).....	4 oz.	2 oz.	1½ oz.

MERCURIC COMPOUNDS. .5 to 1 per cent (page 442). Percentage solutions of either dry or liquid materials are made according to the following table:

Solution Desired	For These Quantities of Mixture					
	One Quart		One Gallon		Three Gallons	
	Add These Quantities of Material					
	Dry	Liquid	Dry	Liquid	Dry	Liquid
.5 per cent.	1/6 oz.	1 1/8 teasp.	3/5 oz.	5/8 oz.	1 4/5 oz.	2 oz.
1.0 per cent.	1/3 oz.	2 3/8 teasp.	1 1/4 oz.	1 1/4 oz.	3 3/4 oz.	4 oz.
2.0 per cent.	2/3 oz.	5/8 oz.	2 1/2 oz.	2 1/2 oz.	7 3/4 oz.	1 1/2 pint
4.0 per cent.	1 1/4 oz.	1 1/4 oz.	5 1/8 oz.	5 oz.	1 lb.	1 pint
5.0 per cent.	1 3/8 oz.	1 1/2 oz.	6 1/2 oz.	6 oz.	1 1/4 lbs.	1 1/4 pints

Table for Liquids

60 drops equal.....1 teaspoonful
3 to 4 teaspoonfuls equal.....1 tablespoonful
2 tablespoonfuls equal.....1 ounce (liquid)

16 ounces equal.....1 pint
2 pints equal.....1 quart
4 quarts equal.....1 gallon

Chapter XXXI

LAWN AND GARDEN WEEDS

By E. L. D. SEYMOUR

THE average tabular information about pests—whether insects, weeds or diseases—is arranged alphabetically according to the scientific names of the subjects. This is all right for scientists and librarians who are more interested in the classification of the troubles than in their cure or prevention. But it is of little value to the practical gardener whose main concern is the habits of the pest and the methods whereby it can be eradicated.

The table of the more common lawn and garden weeds, given on the next two pages, is therefore made up along new lines. The first column lists the most obvious characters of the weeds, enabling even the casual observer to recognize and begin to identify them. The next column suggests their distribution; the third, the season when they are in bloom; the next, their main habits and means of propagation; the next, brief directions as to how to destroy them; and the last two give their common and botanical names.

Weed destruction in a small garden or on a lawn where hand work can be done if necessary, is relatively easy. In any case, the principles of weed control are based on (1) preventing the plants from maturing and scattering seed; (2) preventing the introduction of new weeds, along with seed, manure, etc.; (3) preventing perennial weeds from making any top growth; and (4) smothering out the weeds in lawns by stimulating a vigorous growth of the desirable grass plants.

Large individual perennials, such as Dock, Plantain, etc., and even Dandelion, can be dug out. Annual seed bearing weeds are best controlled by a thorough cultivation early in the season before the first crop has a chance to reseed. The biggest problem is encountered in fighting the perennials that spread by means of rootstocks and underground stems. If possible, the best plan is to dig out the entire root system and burn it. Certain chemical weed killers are useful where they can be applied without injuring valuable plants or poisoning the soil.

Lawn and Garden Weeds

A table of common plant pests, with directions for their identification and eradication

Plant (or Flower) Characters	Where it Occurs	Blooming Period Annual (A) Perennial (P) or Biennial (B)	How Seed is Spread and Plant Multiplies	Control Measures	English Name	Botanical Name
GRASSES AND SEDGES Leafy, branched; roots at joints	Entire U. S. Hoed fields, gardens, lawns	Green flower (A) Spikes, June-Oct.	Seed spread in hay and grass seed and by animals	Prevent seeding, cultivate thoroughly	Crab Grass	<i>Syntherisma sanguinale</i>
Creeping stem. Hardy.	Me. to Pa. and Minn. Cultivated fields	Green flower (P) spikes, Aug.-Oct.	Seed in grass and grain seed. Rootstocks	Repeated hoeing or discing every 10 days from July 1	Quack Grass	<i>Agropyron repens</i>
Resembles Millet	East, except extreme North	July-Sept. (A)	In hay and grain seeds	Mow often to prevent seeding	Barnyard Grass	<i>Panicum Crus-galli</i>
Triangular stems, nut-like tubers	All humid States moist gardens	Brown flower (P) spikelets	Wind, hay and other seeds, also spreads by tubers	Cultivate clean 2 years then crop heavily	Northern Nut Grass	<i>Cyperus esculentus</i>
Dense, branching	Md. to Mo. South Hoed fields and lawns	Purple flower (P) spikes	Seeds sparingly Root stocks	Cultivate out thoroughly	Bermuda Grass	<i>Capriola dactylon</i>
VINES AND CREEPERS Resembles Morning Glory	Entire U. S. Fields and gardens	White or pink small (P)	In grain seed. Also by creeping roots	Cultivate thoroughly. Pull by hand. Apply salt	Bindweed	<i>Convolvulus arvensis</i>
Pink, fleshy radiating stems, small, round leaves	Entire U. S. gardens	Small yellow (A) flowers June-Oct.	By garden tools Long, seeding period	Hoe out then destroy (Will re-root if left)	Pusley, Purslane	<i>Portulaca oleracea</i>
Large, woody; glossy, 3-part leaves, colorful in Fall	Entire eastern half U. S.	Loose, panicles greenish June. Whitish fruit	By suckers Persistent	Sprinkle calcium chloride on foliage. Dig and burn large roots	Poison Ivy or Oak	<i>Rhus toxicodendron</i>
WITH PROMINENT FLOWERS						
White, small, arising from whorl of leaves	Entire U. S.	May-Oct. (A)	Wind blown seed	Cultivate out	Shepherd's Purse	<i>Bursa pastoris</i>
Small, in cymes	Entire U. S. Waste-places and gardens	July-Sept. (A)	In hay, grass and Clover seed	Pull up by roots before it seeds	Fleabane Horseweed	<i>Leptilon canadense</i>
Low branching; flowers in small cymes	Entire U. S. Lawns and gardens	April-Oct. (A)	In grass and Clover seed. Animals	Cultivate and rake out	Chickweed	<i>Alaine media</i>

Lawn and Garden Weeds—Continued

Plant (or Flower) Characters	Where it Occurs	Blooming Period Annual (A) Perennial (P) or Biennial (B)	How Seed is Spread and Plant Multi- plies	Control Measures	English Name	Botanical Name
Large, flat heads, 1 to 3 ft. tall	Me. to Va. West to Miss. R. fields	All Summer (B)	In Clover seed. By wind and animals	Dig out. Destroy fleshy root	Wild Carrot (Queen's Lace Handkerchief has similar larger heads)	<i>Daucus carota</i>
Yellow. Flat heads, bril- liant leaves on rosettes	Entire U. S. Lawns and fields	April-Oct. (P)	Wind carries light fluffy seeds. Taproot spreads but little	Dig out. Apply sulphuric acid to cut root	Dandelion	<i>Leontodon Taraxacum</i>
Yellow. Small, later close clinging burs	Northern States gardens, roadsides	July-Oct. (A)	Seed carried on ani- mal's coats, cloth- ing, etc.	Cut to prevent seeding	Beggar Tick, Sticktight	<i>Bidens frondosa</i>
Orange. On 6 in. to 18 in. stalks from flat rosette	Eastern U. S. Fields and lawns	June-Oct.	By wind Cultivation	Dig out. If grown in rock garden prevent spreading	Orange Hawkweed	<i>Hieracium aurantiacum</i>
Purple. Small, thick leaves, heavy stems	Entire U. S. Es- caped from gardens	All Summer (P)	Wind, roots and crowns	Careful, thorough culti- vation	Live forever	<i>Sedum telephium</i>
WITH INCONSPICUOUS FLOWERS						
Spiny Leaves, milky juice	Central States and far West	Small yellow flowers June-Oct. (A)	Wind	Cultivate; prevent from seeding; burn over in early Spring	Wild or Prickly Lettuce	<i>Lactuca verosa</i>
Finely cut leaves, hairy. Firm green seeds	Entire U. S. Gardens, hoed crops	Small yellow flowers July-Oct. (A)	In field seed. Wind blows ripe plants	Mow before seeds ripen	Ragweed	<i>Ambrosia elatior</i>
Erect, mealy plants	Entire U. S. Gardens, hoed crops	Very small, green July-Oct. (A)	In grain and grass seeds	Prevent seeding. Spray iron sulphate, 100 lbs. to barrel	Pigweed, Goosefoot	<i>Chenopodium album</i>
Coarse leaves, large root, winged seeds	Entire U. S. Gardens, lawns	Green, small (P)	In hay, straw and seeds	Dig out or cut off and put carbolic acid on root	Dock	<i>Rumex (several species)</i>
Flat rosette of leaves, erect flower stalk	Entire U. S. Gardens, lawns, etc.	Very small, white, greenish seeds. All season (P)	In hay, clover seed, etc. Crown spreads slowly	Dig out. Cultivate thoroughly thereafter	Plantain	<i>Plantago (many species)</i>

Readers will assist themselves to a proper understanding of the information given on these two pages by studying carefully the explanations on page 446. Weeds are disagreeable objects and a knowledge of how to keep them in subjection is a comfort and satisfaction to the land owner

Chapter XXXII

GREENHOUSES AND CONSERVATORIES

By J. N. McARTHUR and ERNEST D. CHABOT

What Can Be Done in a Small Greenhouse—Greenhouses for the Moderate-sized Home Owner—Leanto Greenhouses—Ornamental Conservatories—Greenhouse Heating—Locating the Greenhouse

THE increasing number of greenhouses that have been built during the past few years indicates that thousands of men and women everywhere are beginning to appreciate more and more the true value, pleasures and profits derived from the ownership of even a small one. This may be largely due to the fact that manufacturers have now taken all of the flaws and knocks out of them and simplified all the complex architectural and engineering problems, which formerly made them expensive to buy and operate. A greenhouse of moderate dimensions can be had now from a few hundred dollars up, and its upkeep is nothing like that of an inexpensive automobile.

To those who spend from \$200 to \$400 or more yearly on plants and flowers there is real economy in owning a greenhouse, and those who spend less will find the value of its output in excess of this amount, for the abundance of flowers, vegetables, bedding and potted plants that can be grown in a small greenhouse is far out of proportion to the investment and would cost much more were they to be bought elsewhere. This is even more pronounced in homes where there is a gardener or attendant who looks after the place. The man has little to do during the Winter months, so that a greenhouse provides a means of employing his time to grow flowers and plants and to raise vegetable and bedding plants for the garden when they are needed.

So confident are we as to the pleasures and profits to be derived from the greenhouse, especially in the cold Winter months and in the Springtime before the ground is warm and dry out of doors, that we most heartily urge its consideration.

WHAT CAN BE DONE IN A SMALL GREENHOUSE

The Unheated Greenhouse for Fall and Spring

The greenhouse is not always, and does not necessarily have to be, equipped with a heating system. It can be used just like a big, handy coldframe in the late Summer and Fall and in the Spring where the flower lover can go in and work comfortably, rain or shine, without having to bend down on hands and knees and tire out with planting and caring for the plants.

In the Fall there are many flowering plants that can be kept in flower long after the outdoor plants are gone if they are lifted, potted and moved to a greenhouse. The best known of these are Chrysanthemums, late outdoor Lilies, Snapdragons, Salvias, Heliotropes, Sweet Alyssum, etc. Violets, Pansies and many bulbous plants can be had in bloom practically all Winter long. Lettuce, Radishes, Swiss Chard and other greens for the table can be grown all Winter, too.



Courtesy Hitchings & Co.

A most effective linking of the greenhouse and residence

In the Spring, even so early as March, a great variety of seeds can be started for growing bedding and vegetable plants for outdoor planting as soon as the frost is well out of the ground. You can have Corn, Tomatoes, Cabbage, Cauliflower, Cucumbers, Melons and Peas at least a month in advance, if the seeds are sown early in the greenhouse.

Then, all Summer long, flowers can be grown that do not thrive out of doors because of plant pests. These pests can be *kept out* of a greenhouse by fumigation.

The Heated Greenhouse

Everything can be done in the heated greenhouse that can be done in the unheated one, besides having a succession of flowers and vegetables all Winter long. It is possible in a small greenhouse to grow and flower Roses, Orchids, Carnations and the like, but these are often slow in growing and take up considerable space, so it is not advisable to grow them unless considerable space is available.

Quick growing annuals, often found in the Summer garden and most varieties of bulbs give very satisfactory results and make a splendid showing in a short time with only a small amount of effort. Among other subjects that can be grown are ferns, Azaleas, small palms, Primroses, Begonias, Cyclamen, Lobelia, and all the old-fashioned, homey flowers from Forget-me-nots to Cosmos and from Nasturtiums to Marigolds.

There are many hardy plants that are usually grown in the rock garden that may be placed in what are called flower pans; that is, receptacles as wide as a 5, 6 or 7 in. pot, but only 3 or 4 in. deep, and which can be brought into flower in February, March and April in a greenhouse that has no higher temperature than 50 degrees.

GREENHOUSES FOR THE MODERATE SIZED HOME OWNER

To stand out most attractively and give the best results in growing, the greenhouse should be built to duplicate the actual airy outdoor conditions of light and sunshine as nearly as possible. During the short days of Winter when the arc of the sun is very low, shade casting structural members are a distinct disadvantage in any greenhouse. This fact should be kept in mind when selecting one. Other points you will probably consider are: (1) The amount of bench area you want for growing; (2) The space available for the greenhouse; (3) The amount of money available for its purchase.



Courtesy Hitchings & Co.

This exterior view of a Junior greenhouse shows how attractively it can be blended into the garden

The greenhouses, leantos and conservatories which are illustrated and described on the following pages are well recommended and representative of the requirements of the average moderate sized home owner.

The Junior Greenhouse

This is known as the straight eave type, which harmonizes perfectly with architecture that has angular lines. It is 10 ft. wide and made in six lengths, from 12 to 33 ft., in multiples of 4 ft. 1 $\frac{3}{4}$ in. sections, so that the exact amount of bench area required may be selected. This greenhouse can be fully equipped with growing benches, potting bench, boiler, Perkheater hot water heating system, plumbing and masonry, either completely erected or materials only, for less than the cost of an inexpensive automobile.

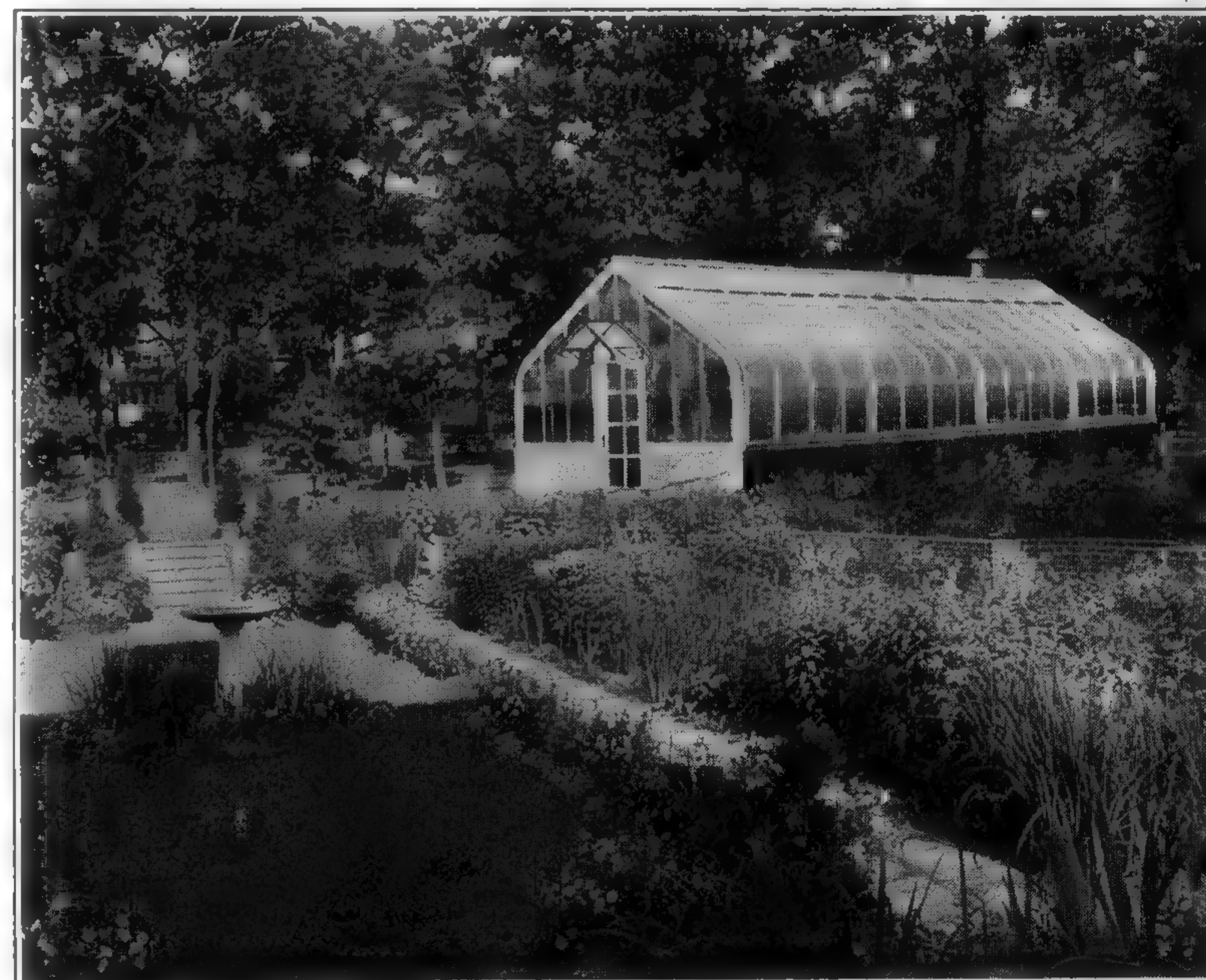
The greenhouse is of sash construction and is delivered to the site of erection in completely assembled sections, painted and glazed, with built-in asbestos rock walls, ready to set up and bolt together.

Even the hinges and hardware are fixed in place, the holes for the bolts drilled and the bolts and screws supplied, so it is a very simple matter to bolt the few fitted sections together to erect it.

The heating pipe is also cut to length, threaded and assembled with fittings, so far as practical, to make its installation easy. The heat is supplied by the Perkheater hot water heating system which is described on pages 458, 459 and 460.

The Self-contained Curved Eave Greenhouse

The curved eave greenhouse is known as the ornamental type and harmonizes with almost all types of architecture, and particularly that which has gentle curves. The self-contained greenhouse was designed to be complete and compact and provides every convenience to make growing in it easy and practical. All shade casting members are removed from the eave line, so that the glazed portion



Courtesy Hitchings & Co.

This is the ornamental self-contained curved eave greenhouse. It measures 14 ft. 9 in. wide by 35 ft. long and the length balances perfectly with the width

extends in one unbroken span from the sill to the roof ventilators, allowing the greatest amount of light to enter the greenhouse from sunrise until sunset.

The greenhouse measures 14 ft. 9 in. wide by 33 ft. long and its width balances perfectly with its length. A house of this type will give the utmost satisfaction and make an impressive showing on even the most pretentious grounds.

The full steel frame is built to last in the proper structural shape with ornamental curved eaves. All parts are cut and fitted so far as practicable before they reach the site of erection. Asbestos rock walls greatly simplify the masonry work, though concrete or brick walls to match with adjoining buildings may be substituted, this adding slightly to the cost.

Heat is supplied by the Perkheater hot water heating system and an automatically controlled oil burner is standard equipment. There are many advantages in heating the greenhouse with an oil burner. Controlled by a thermostat, it heats the greenhouse perfectly and safely, requiring little or no attention from Fall until Spring. This insures economical operating costs and dependability.

A 275-gallon oil supply tank is set just outside the greenhouse and near to the boiler. Present day oil delivery service is so well organized that supply is guaranteed. The oil burner, being of the retort type, is quiet and economical. No. 2 furnace oil is used.

The complete greenhouse is less expensive when so equipped, for when coal is burned in the boiler required by a greenhouse of this size, a partition is needed to separate the growing benches from the boiler in order to protect the plants from coal gases and ash dirt, which are very detrimental to plant life. A brick chimney is also required to create the proper draft for this size boiler, so that you pay more and have fewer conveniences when coal is burned.

LEANTO GREENHOUSES

The leanto greenhouse often solves a problem—the problem of space. It will fit into places where the usual ornamental type of conservatory won't go and it is less expensive. Sometimes there is a narrow strip available near the side line of the plot or along a terrace. Or it may be an unused corner where the leanto will fit in attractively and improve the ground lines of the residence. This is one advantage to start with; there are many others.



Courtesy Hitchings & Co.

Notice how perfectly this leanto greenhouse harmonizes with the architecture of the old English house. Perhaps the fact that the leanto was originally an English idea has something to do with the pleasing effect

The leanto can be built to harmonize with all types of architecture. A residence is hardly conceivable to which the adjoinment of a leanto would not be pleasing. Its length, height and width can be designed to balance perfectly and its eave to conform with the particular type of architecture of the building to which it is attached.

Unless it is intended that the leanto be used for growing orchids, ferns or other shade loving plants, success with other plants demand that it be located on the south side of the building or in a position where it will get the benefit of the sun's rays from early morning until at least three o'clock in the afternoon.

The leanto can often be heated from the same heating plant that heats the residence to which it is adjoined, providing, of course, that the boiler is of ample capacity or that additional sections can be added to it. Since the leanto is usually attached to the southern

side of the building and is protected from the cold north winds, it is easily heated.

You can grow anything in a leanto that you can in any greenhouse. Size is its only limitation. There is no space wasted, and if you like Mushrooms, arrangements can even be made for growing them under the benches.

If you have French doors opening into your leanto from your living room or dining room, it will be distinctly a conservatory, where, in your slippers, so to speak, you can step into your garden and keep a close eye on the progress of your plants regardless of the weather outside. Great fun this gardening under glass, for people who enjoy their homes and gardening.

ORNAMENTAL CONSERVATORIES

Ornamental conservatories are designed and built for the purpose of growing plants, as well as conserving them. The atmosphere in a conservatory is heavily laden with humidity and there is always more or less condensation forming on the glass and various parts. This is as it should be; plants thrive under such conditions. But due to the high degree of humidity, a conservatory is not a place for fine furniture or rugs. Its furnishings must be of a more durable type.

Like the leanto, the conservatory can often be heated from the same heating plant which heats the residence and it should be located on the southern side or in a place where it will get full benefit of the sun's bright rays all day long.

Think of the pleasure one of these crystal gardens will add to your home—the enjoyable atmosphere its subtle bloom fragrance will lend, and what a cozy retreat it will make to entertain in! These are just a few of the joys in having one linked to your home.

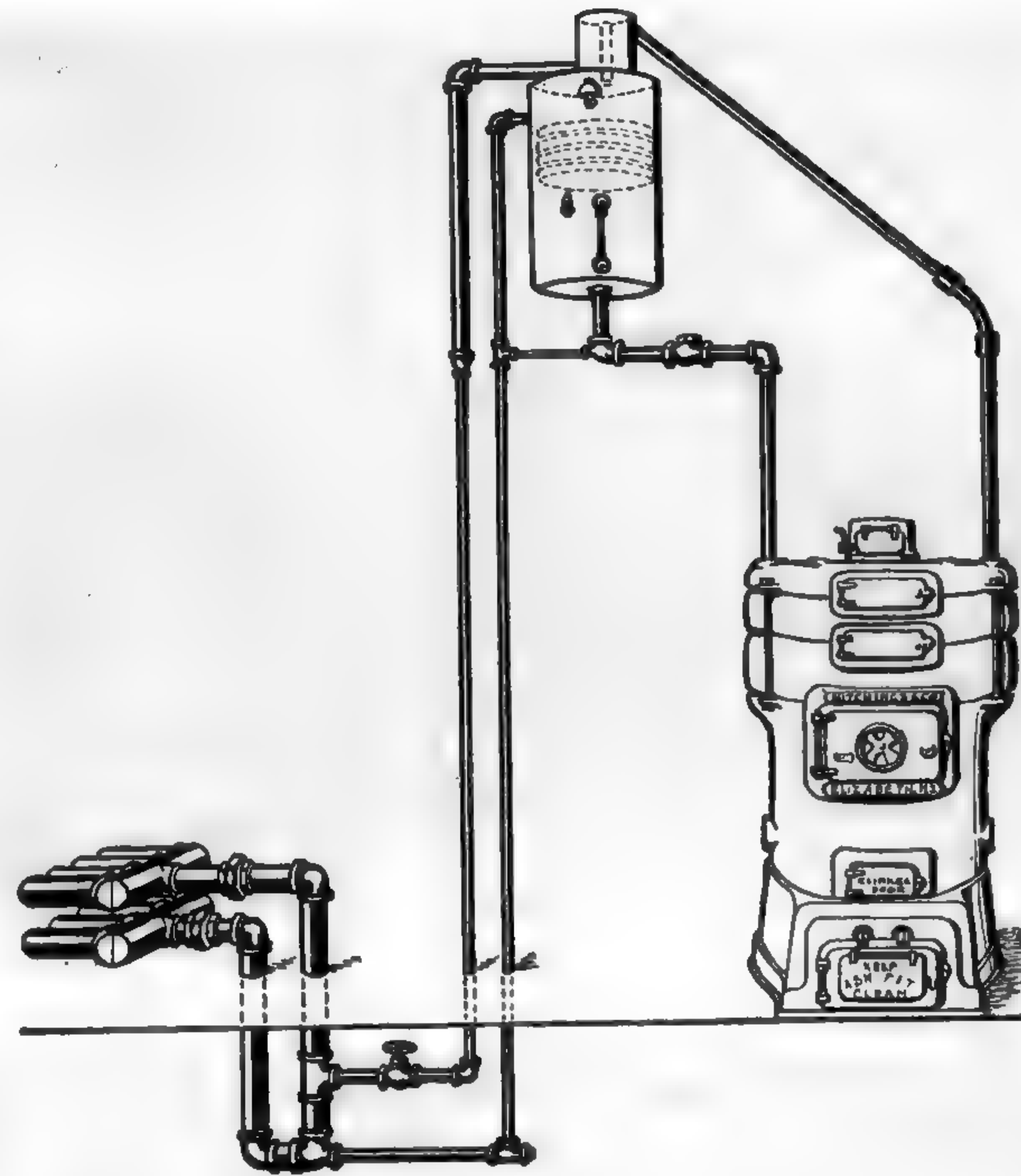
GREENHOUSE HEATING

Hot water heating systems are the most practical to use for heating small greenhouses because they give a more dependably even heat, require less attention and are more economical in fuel consumption. Size, temperature and local conditions of the site of erection are factors to consider in selecting the right heating system for your greenhouse. In some cases the greenhouse can be heated by an existing heating plant used for furnishing heat to other buildings.



Courtesy Hitchings & Co.

This formal conservatory opens directly off the dining room, so that at breakfast the owner faces its flowers and plants flooded with glorious sunshine. At night its beauty and fragrance is an ever enjoyable part of the dinner



Courtesy Hitchings & Co.

Diagrammatic illustration showing the simplicity of the Perkheater hot water heating system

Greenhouse heating is radically different from dwelling house heating, so, to obtain the best results, a greenhouse heating engineer should be consulted. Heating pipes in a residence run vertically and the vertical piping insures a rapid circulation, but in a greenhouse where the piping is horizontal, there are often difficult problems to contend with.

Generally, the heating coils in a greenhouse are located under and run the full length of the growing benches. An extra amount of pipe is placed under benches on which propagating is to be done because bottom heat is necessary to root the cuttings.

It is always advisable to use a boiler in the greenhouse which has been specially designed to meet the exacting conditions of greenhouse heating. In the majority of cases, the cast iron sectional type is used.

It can be increased in size as additions are made to the greenhouse. Either oil or coal may be used for fuel.

There are two types of hot water heating systems used in greenhouse heating—the gravity hot water systems and the Perkheater hot water system.

Gravity hot water heat is very satisfactory in greenhouse heating, but requires a boiler cellar or pit, so that the boiler can be placed a considerable distance below the heating coils to insure proper circulation. The depth of the boiler cellar or pit depends on the size of the boiler and heating system. As the water is heated in the boiler, it rises through the flow from the top of the boiler and circulates through the mains and coils and then returns to the bottom of the boiler. A tank must be installed to take care of the expanding water, as it varies in temperature.



Courtesy Hitchings & Co.

This shows how the Perkheater system is installed in the Junior greenhouse. Notice the small amount of space occupied by the boiler and Perkheater tank. The heating coils are located under and run the full length of the growing benches

This tank is placed at the highest point of the system and is fitted with a gauge glass so that you can easily see whether or not the system is supplied with water.

The Perkheater hot water system is the newest development in greenhouse heating and has many advantages over the gravity system. It is constructed so that the boiler can be placed on any convenient grade or elevation and consequently do away with the expense of digging and walling up a boiler cellar or pit. This makes a lighter and cleaner heating plant and saves the bother of climbing up and down stairs to tend the fire and carry out ashes. Ugly overhead mains running through the greenhouse are also unnecessary with this system, for reasons you will learn after further reading.

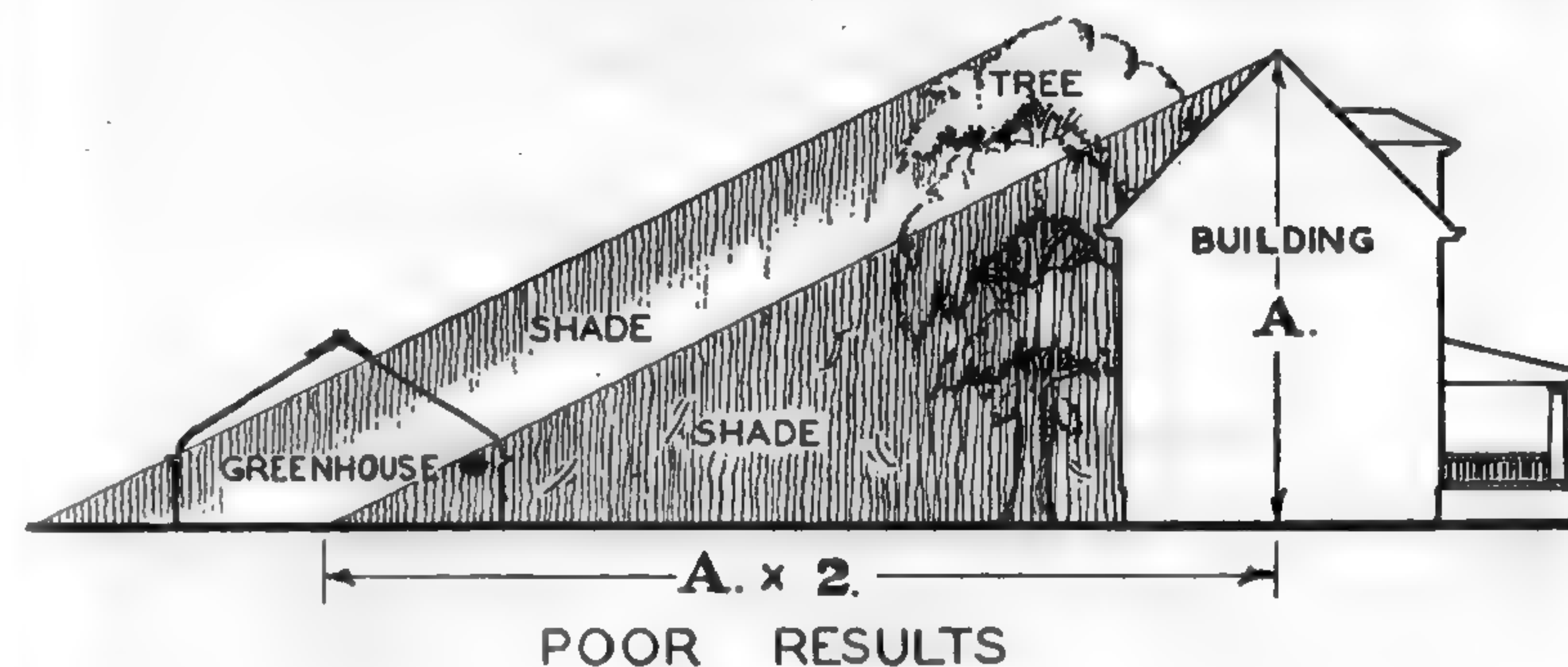
The system is very easy to install, since it simply consists of a tank placed over the boiler and higher than the radiation and mains. This tank, which is known as the Perkheater tank, is divided into an upper and lower compartment, without a direct flow connection between them. The pipe from the top compartment is the flow to the heating coils, and the pipe leading to the lower compartment is the return from the coils. The lower part of the tank is equipped with a gauge glass. It replaces the usual expansion tank of the gravity system.

Faster circulation is positive in this system, because of the difference between the water levels in the upper and lower compartments in the tank. This head is several times greater than the usual head set up in the common gravity system, so that smaller mains can be used.

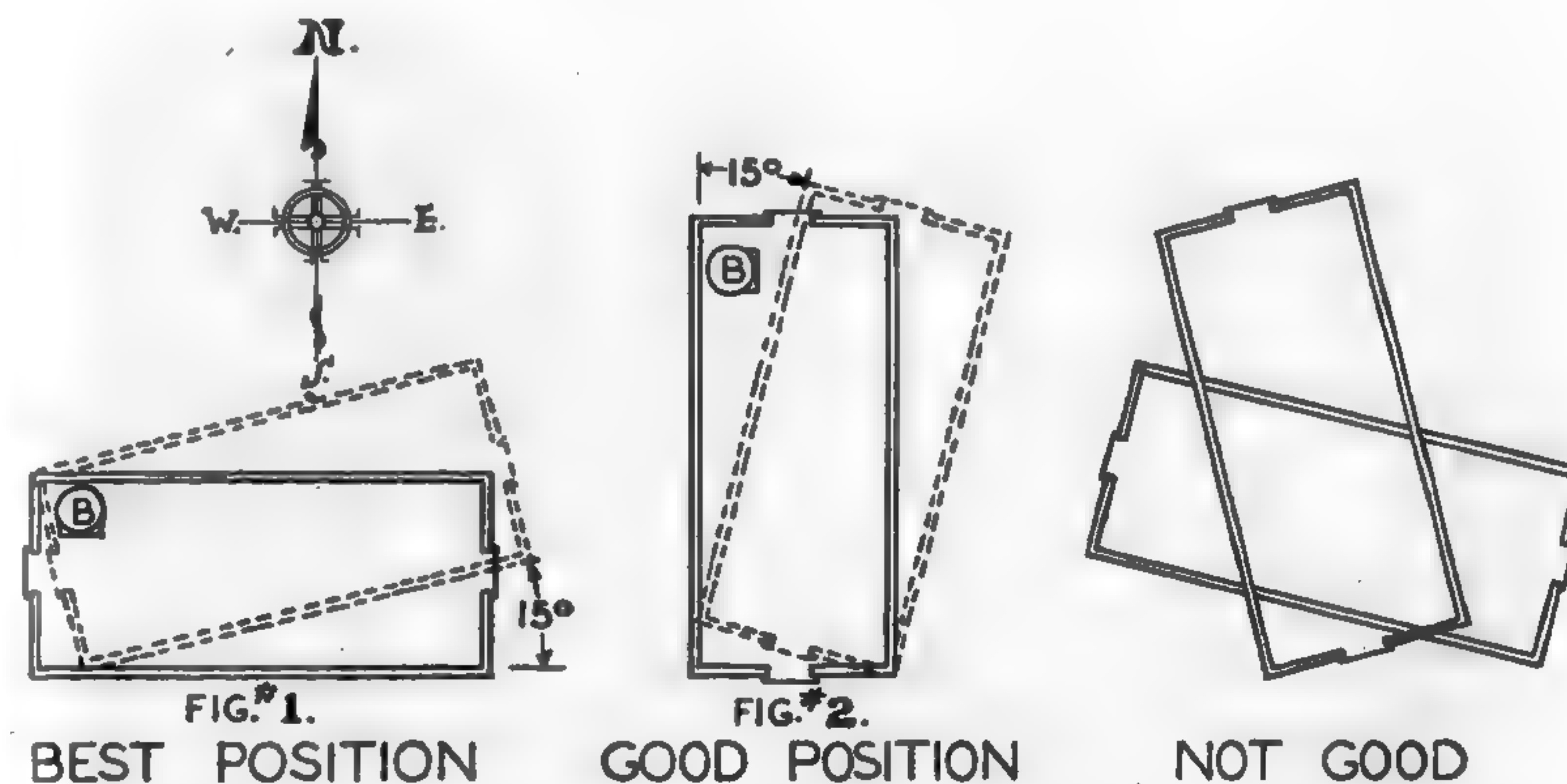
LOCATING THE GREENHOUSE

After deciding on the type of greenhouse you need, the next important step is to pick a good location for it on your grounds, one where it will not only look well and harmonize with its surroundings, but where it will be practical for extensive growing. First, of course, the site should be reasonably level. No building should be done on recently filled-in quicksand or swamp ground without taking care to ascertain that the house will not settle, or without employing extra construction to meet the individual conditions.

The greenhouse should be placed where it will get the Winter sun, particularly the *morning* sun. Shade after 3:00 p.m. in the Winter is of little detriment. The Winter sun is at an angle of approximately 26 degrees at noon, so that 1 ft. of obstruction to the sunshine casts 2 ft. of shade, as illustrated by the sketch at top of opposite page.



Avoid placing greenhouses under trees, even when they are to the north. Ice will fall from them and do damage. Keep greenhouses away from under the eaves and away from valleys of nearby buildings, as here also ice may fall on the glass.



BEST POSITION

GOOD POSITION

NOT GOOD

Figure 1 shows the best position for locating the greenhouse—due east and west or in a position with the east end turned within 15 degrees to the north. Figure No. 2 shows the second best position—due north and south or in a position with the north end turned within 15 degrees to the east of that position. Any other positions are not good. The boiler is located on the north or west end.

Chapter XXXIII

GARDEN FRAMES

By ALFRED J. LOVELESS

Coldframes—Hotbeds—Electric Equipment

THE one light frame, used either as a hotbed or coldframe, is essential in all gardens, and on account of its portability it can be used wherever a suitable location is available. Its uses are legion.

To the great majority of amateurs a frame 3 ft. x 6 ft., the standard size of sash, will answer all purposes and can be easily handled. However, a frame may be made to any size by the addition of units to meet individual requirements. It may be built of wood, or of concrete, the latter making a permanent frame but not a portable one.

A coldframe should be painted inside with coal tar or some preparation to preserve its life. A hotbed frame, on the other hand, gets little benefit from such treatment, and a washing with lime each season is recommended to keep things sweet.

When building of wood it is better to use 2 in. planks, which make a durable and rigid frame, although 1 in. cypress boards may be used to good advantage by driving a 2 x 4 in. in each corner, on the inside of the frame, deep enough to make a firm job, making the frame the exact width of the sash, outside measurement. Then, by nailing a 1 x 2 in. strip along the sides, allowing 1 in. above the side of frame, you have a guide for the sash and also a protection against cold drafts under the edge.

The sides should come well down, as the soil for coldframes should be a few inches below the ground level, and, assuming you use a 3 x 6 ft. sash, the length should be 5 ft. 10 in. to allow for drip clearing the frame at bottom of sash. A screw eye and hook will keep sash secure against windstorms.

The pitch or slope of a garden frame should be about 6 in., with the inside soil sloping accordingly, so as to keep all plants the same growing distance from the glass. This slope will insure perfect drainage, both inside and outside the frame.

A double glazed sash will keep out much more cold than single glass on account of the vacuum formed between the glass, providing

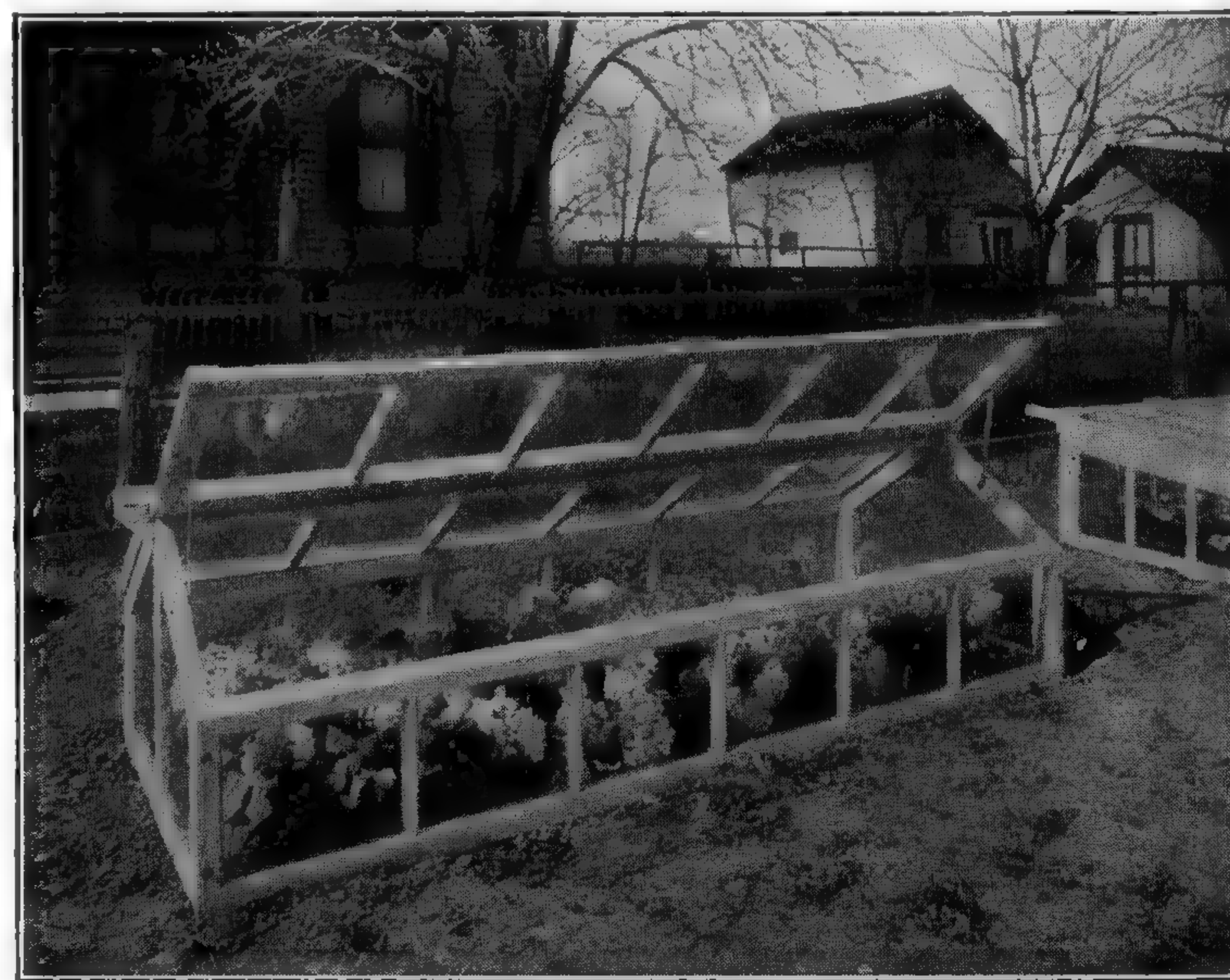
the glazing is tight. Where plants are grown for Winter, such as Violets, it is a great advantage to have this additional protection.

An even span or hip-roofed frame can be used for growing house plants to better advantage than the flat frame, as the individual plants can be more easily handled when grown in pots.

COLDFRAMES

Coldframes can be utilized in so many ways that the following suggestions are given only as a guide for the amateur. Many new uses will suggest themselves as difficulties are encountered in growing plants which are found to require slight protection and which need a coldframe to insure success.

A coldframe has absolutely no heat except solar heat, so that the intention is protection rather than forcing into growth, and the carrying of many tender plants through the Winter, that would otherwise perish. A rich, sandy loam is ideal for frames. Should the natural soil be of a heavy nature, mix into it some well rotted manure, a little leafmold and some sand.



One of the King Construction Co.'s double-glazed frames, a very valuable type

To insure perfect drainage, a 4 in. layer of cinders covered with coarse straw to keep it open, will give good results.

The two most important factors in the care of frames are watering and ventilation. Watering should be done sparingly, and only when the soil becomes dry; and ventilation should be given on all sunny days. Care in ventilation is also essential. On bright windy days, air should be given by means of small wood blocks placed under the edge of the sash, the opening varying according to outside temperature.

The soil inside the frame should be a few inches below the regular grade. Care must be taken to protect the frame from any outside flow of water by banking with soil, which may reach to the top of the frame; this also acts as a barrier to keep out frost, but an additional banking with strawy manure mixed with leaves will be necessary for Winter protection.

In cold weather the frames may be protected by a covering of straw or mats, but if the soil inside is not frozen and plants are growing, this protection must be removed during the day. However, if the soil inside the frame is frozen, the plants may remain covered for several days without injury; in fact, after the soil is frozen, the sash may be removed and snow allowed to cover the plants, which we will presume are half hardy plants being protected during the Winter. Then, as the snow melts, the frame must be covered again to prevent thawing, which is at all times to be avoided, this being the most frequent cause of failure with unprotected plants.

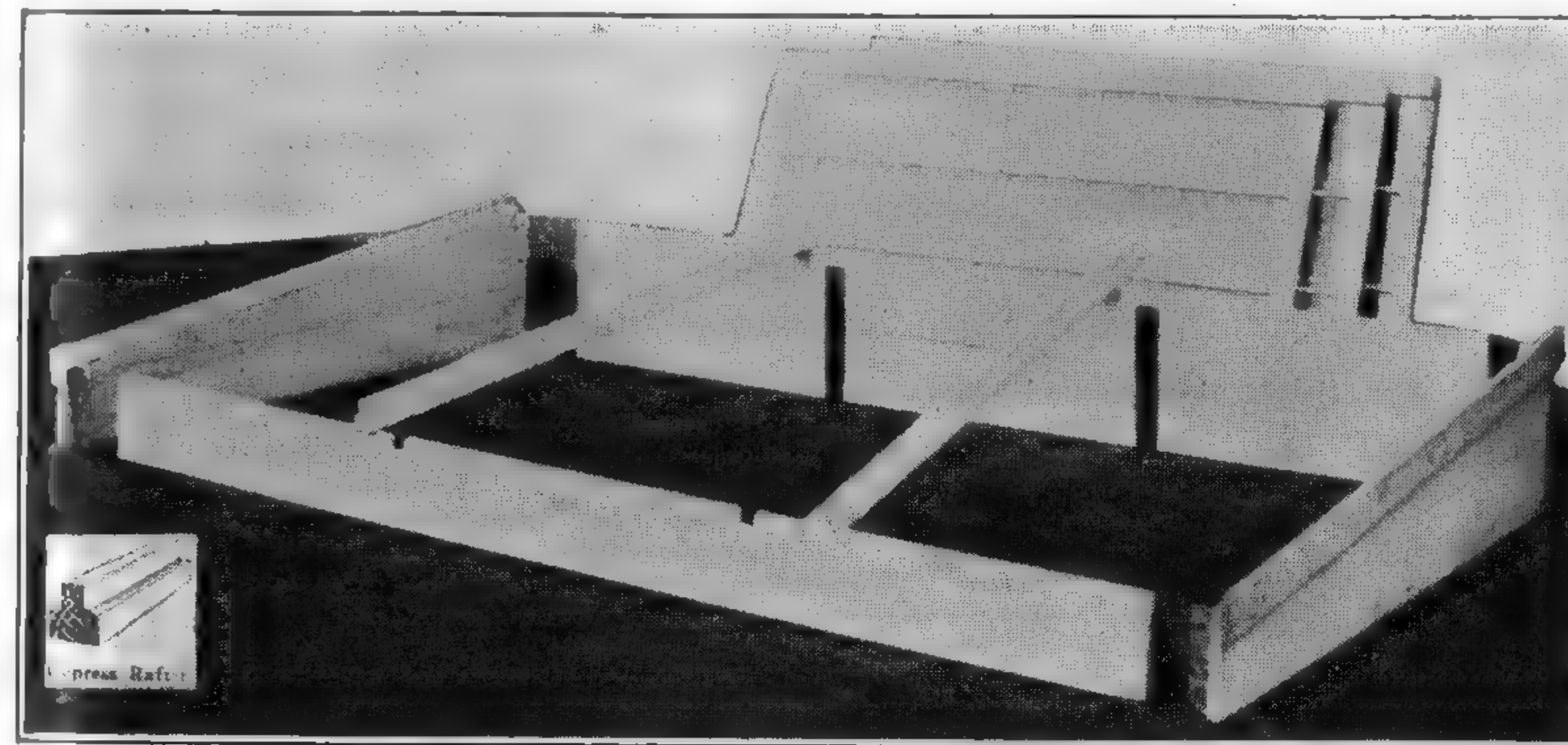
This open air treatment will be found beneficial for the germination of many alpine seeds, or seeds of slow germination, such as Gentian, Lobelia cardinalis, etc. Seeds of this kind are best sown in pans or flats, as the seedlings often appear after the surface has become covered with moss a year after the seed was sown, or even later than that with many varieties.

Many kinds of flowers can be grown successfully in coldframes. Violets, if planted from runners in June, will be nice plants by Fall, and if protected through the Winter will furnish many a bunch of fragrant and well colored flowers. In very cold weather care should be taken to open the frame very little, gathering the blooms as quickly as possible and placing them in a covered receptacle to keep them from freezing during the operation. Wallflowers can also be grown successfully if sown in May and transplanted into the frames when ready.

Myosotis or Forget-me-not will flower very early, if the seed is sown in July and transplanted into the frame when large enough. These are the easiest things to grow and only need a covering of straw to protect them from the sun during the Winter. Pansies are popular for Spring flowers, and if sown in July will make nice plants before Winter, only a light protection being necessary. Nothing gives greater satisfaction than Pansies in early Spring, when they may be planted in the border, giving a bountiful supply of pleasing flowers until real hot weather retards their growth. Hollyhocks, Violas, Foxgloves, Columbines, Campanulas, Daisies, Primroses, Sweet-williams and many others can all be wintered in a coldframe; they make splendid plants which bloom the first season.

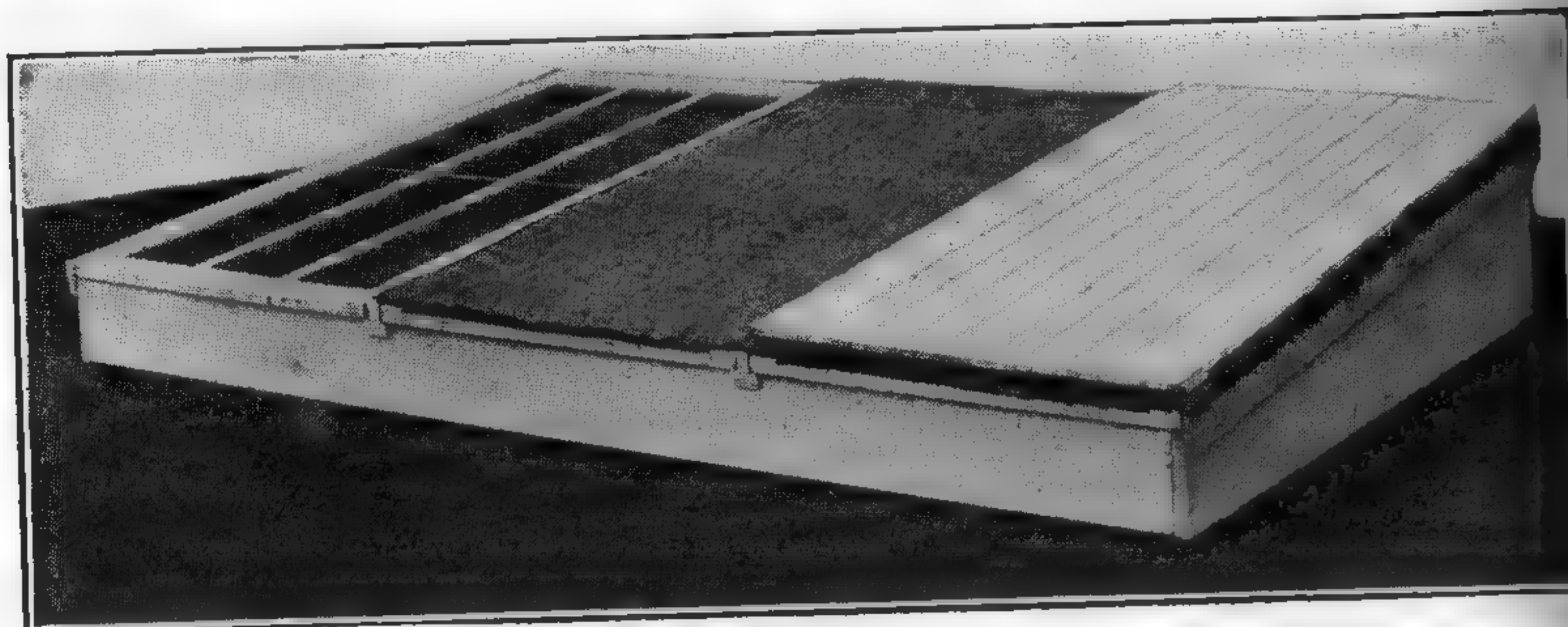
All annuals can be sown in a coldframe and transplanted in the garden as weather conditions permit, a few only resenting disturbance, such as Poppies, Lupines, etc., and these should be sown where they are expected to flower.

Many uses for the coldframe will suggest themselves during the Summer, such as drying seeds, maturing bulbs or for the protection of plants from rain. A coldframe is an excellent place in which to store Amaryllis and Nerines throughout their resting period. During this time they should be kept absolutely dry and allowed all the sun possible, particularly Nerines, which should be placed on a board to guard against moisture from the ground, which would start the bulbs into growth prematurely.



Courtesy Hitchings & Co.

This type of portable frame is very easy to assemble or take down
Heavy angle brackets are screwed to the end pieces so that all one has to do is put in a few screws, drop the rafters in place and the frame is complete



Courtesy Hitchings & Co.

The same frame as shown on page 465, with a mat and shutter in place. Mats are used at night and on dull days when the frames do not get the benefit of warm sun rays. Shutters are used to place over the mats and prevent glass breakage.

Christmas Roses (*Helleborus niger* or its hybrids) make a beautiful display around Christmas time if grown in a coldframe and the sash put on when the flowers begin to show. Tender Tea Roses may be taken up and wintered in a coldframe; and Sweet Peas started in October in pots and plunged in the soil, will develop such root action that when transplanted to the open ground as soon as severe frost is over they will give remarkable results in flowering.

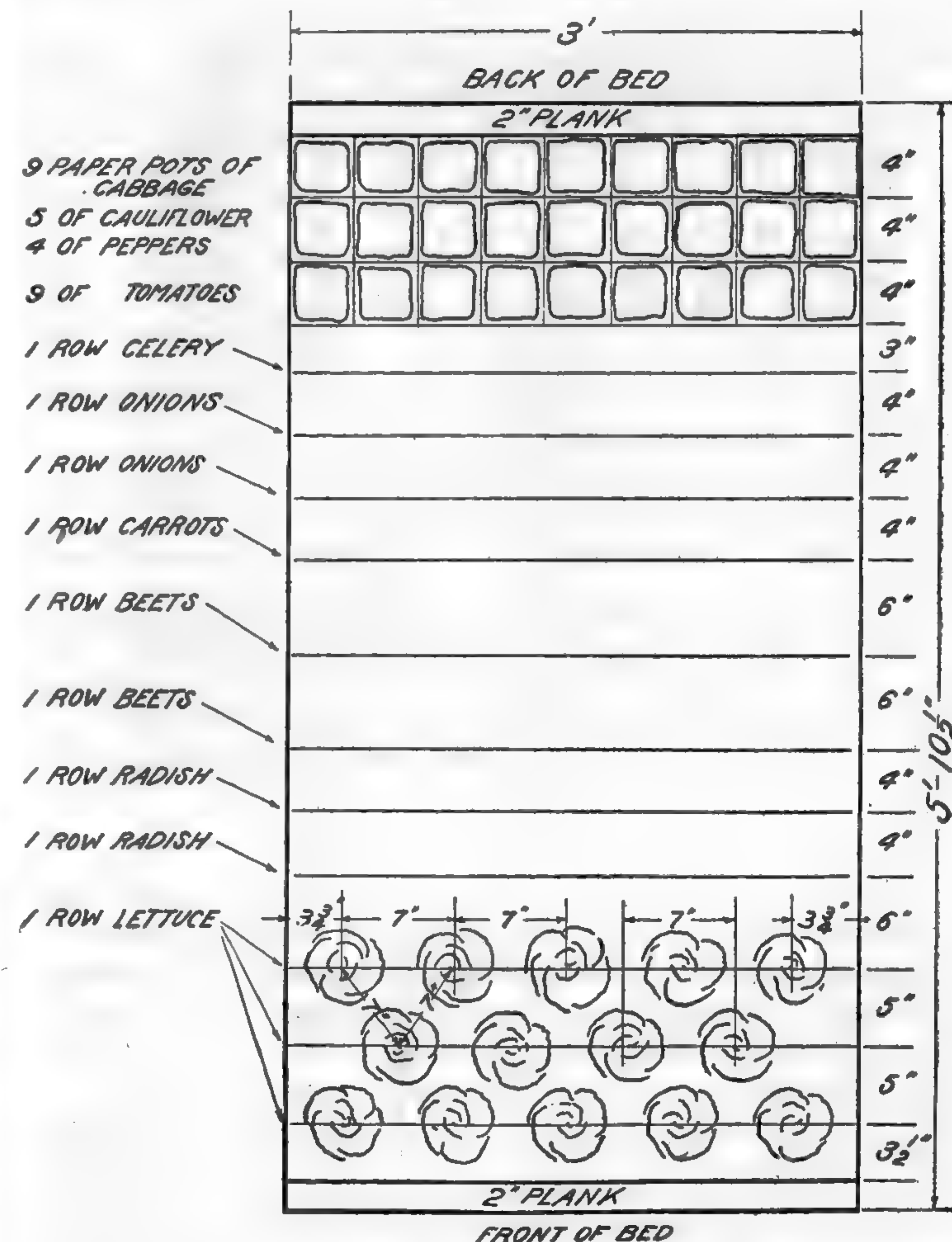
Probably the most general use of a coldframe is the raising of seedlings for the flower and vegetable garden, and many subjects raised in a hotbed can be transferred to a coldframe and the hardening process carried along until planting time. Lettuce can be grown successfully if sown in September and transplanted into the frame when large enough, allowing 8 in. between the plants. By cold weather these will be starting to head and can be carried a long time in that condition, as growth is naturally slow after cold weather sets in.

A Winter covering should be provided for coldframes to keep out severe cold; this may be burlap or straw mats made for the purpose, straw, salt hay, leaves, or anything which suggests itself for protection. Wood shutters may be used, and while these cost more and are not as effective as some of the coverings mentioned, they have the advantage of being neater and easily handled, and if used in combination with burlap mats, answer the double purpose of keeping the mats dry and acting as an additional prevention against cold.

HOTBEDS

Hotbeds, unlike coldframes, are used for promoting early growth through the addition of some heating medium. Heretofore this addi-

tion has usually been fresh stable manure, so assembled and compacted that a medium heat is generated for a long time, the duration depending on the composition of the material used. Stable manure, with the longest strawy portion shaken out and firmly compacted, and not less than 2 ft. in thickness, will produce a violent heat for a



Plan for the planting of a hotbed. The frame is 3 ft. wide by 5 ft. 10 1/2 in. long

short time; but if leaves are mixed with the manure, a more durable growing temperature can be maintained.

A hotbed must be made deeper than a coldframe, for the obvious reason that the bed of heating material is underneath; but if more convenient, an ordinary coldframe may be used by placing it on top of a good heap of fresh manure, allowing at least 6 in. of soil for the plants.

Prof. A. E. Wilkinson of Connecticut Agricultural College gives the following discussion of vegetable combinations that can be grown in a hotbed:

"Radishes, Lettuce, Beets and Carrots seem well adapted for growing together, while Tomatoes, Eggplants and Peppers, although they can be raised with the others, will grow better if given a higher temperature, and conditions slightly different from, those required by the first four plants named. Through experience the various requirements of different plants will become known to the grower.

"A good plan for planting a hotbed for the home garden is shown on page 467. The Cabbage, Cauliflower, Tomatoes and Lettuce that are transplanted to this bed can be first raised in a small flat, which is a wooden box 12 in. wide, 18 in. long and 2½ in. deep, filled with dirt, earlier in this bed, in another bed, or in the house at a sunny window or behind the stove. Other plants, such as Radishes, Beets, and Carrots, are sown for maturing in this bed. For the best results they will require thinning, the Beet thinnings being used as greens. The seed of Celery and of Onions is sown and the seedlings are transplanted later.

"After the Lettuce plants have been disposed of, one row of Cucumber seeds may be planted, the plants being thinned later to 6 in. apart. Cucumbers may be planted also after the pots at the back of the bed are removed. The Cucumber plants are then allowed to spread at will and to mature a crop of Cucumbers for slicing or for other uses as required.

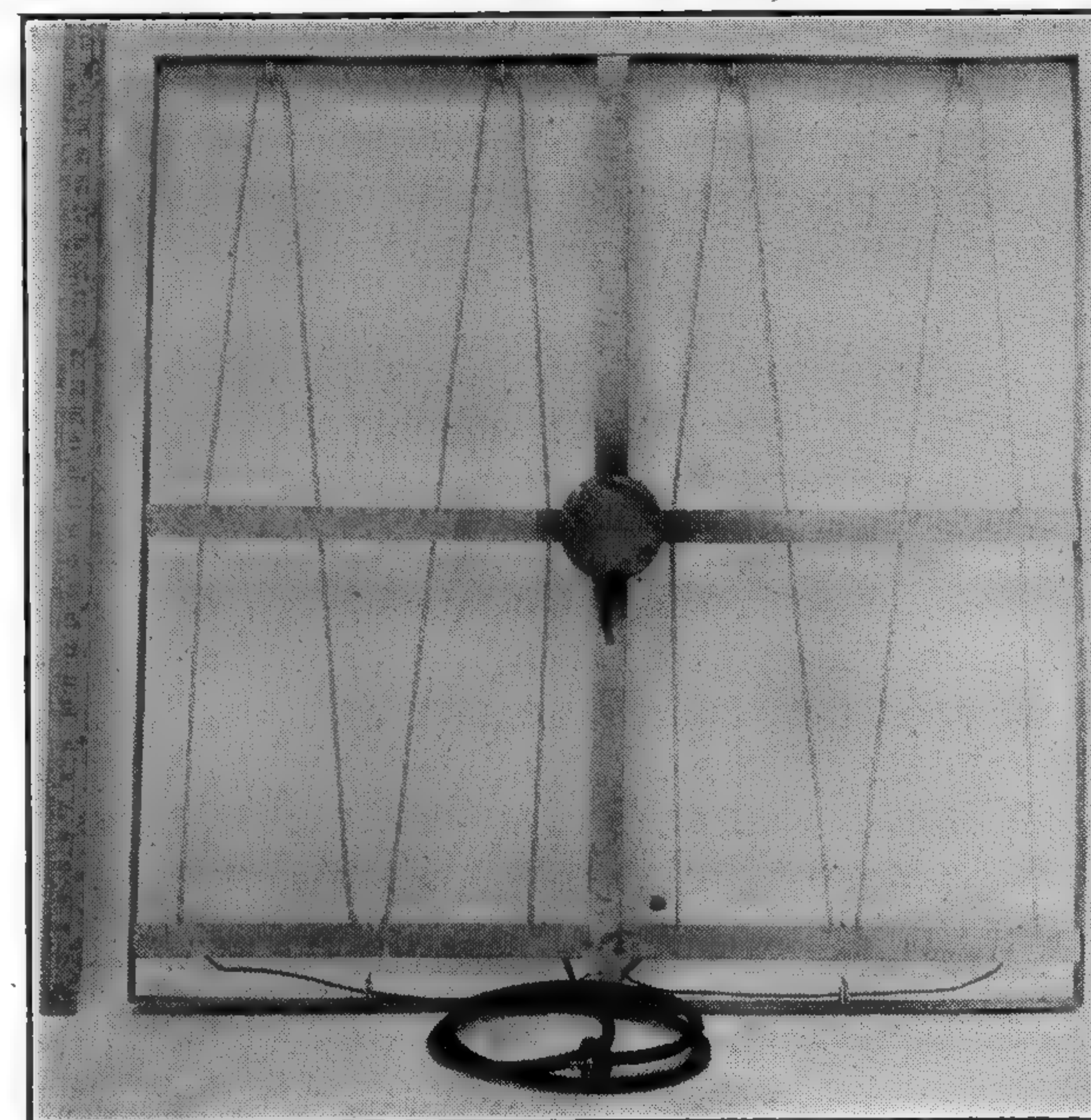
"After one crop is taken out another can follow, the soil in the bed being forked over and raked level between crops, and after the manure is spent the bed can be used for the development of vegetables throughout the Summer. In the Fall the soil and the spent manure are taken out of the hotbed pits, the sash is stored away, and the board covering is replaced for Winter protection. Fresh manure is used every Spring, also fresh soil, the process of making and managing the hotbed changing only as the operator becomes more experienced in successful hotbed work."

ELECTRIC EQUIPMENT

As the use of the automobile becomes general, stable manure gets scarcer and hard to procure, and so we have to harness electricity to our frames and plug in for heat as we do for other electrical household appliances. A hotbed under these circumstances is a pleasure undreamed of only a short time ago; several commercial systems have been recently put on the market for this purpose.

They are more evenly controlled and have the advantage of either hastening or retarding growth at will. The installation is either assembled, ready to put in the frame, and consists of a heating element properly distributed over the bottom and connected with the lighting circuit.

They are economical to use, the cost being probably less than the cost of manure, where the charge for current is not excessive. These heating units may be made in any size to suit individual requirements, and will probably entirely supersede the use of manure for hotbed purposes, the labor being reduced to a minimum and the results far



Courtesy Westinghouse Electric Co.
Modern electrical hotbed unit, only about 32 in. square by the yard stick

more certain and dependable, which should appeal strongly to all amateurs who do their own gardening. It can be used in the city in very small yards and on house roofs; and, too, many an odd corner could be used to advantage in which to indulge in a little gardening.

There are several different systems appearing on the market, and while all are probably good, since they are about the same in general construction, the only choice seems to be in the economy of current used in the different systems to accomplish the same results. This, of course, can only be determined by actual operation under the specific conditions for which it may be required, or perhaps through

the statement of the manufacturers as to the amount of heat each unit will deliver under various changes of outside temperature.

For rooting cuttings the electric outfit supersedes all other forms of heating, and has been successfully used in the propagation of Blue Spruce and other evergreens, Azaleas, Camellias, Chrysanthemums, Geraniums, Carnations, Daphnes, and for raising seedlings in early Spring. It is much quicker than other methods, germination taking place in much less time, because of the even temperature which can be maintained underneath without affecting the overhead temperature. This insures sturdy plants, and the attention required is reduced to a minimum, the heat being under perfect control by means of a thermostat.

Being a comparatively new idea for hotbeds, many uses will suggest themselves when one becomes familiar with its operation, but undoubtedly it has come to stay.



Chapter XXXIV

GARDEN TOOLS

By HARRY R. O'BRIEN

WE all know that every gardener needs tools of some kind, but success depends more upon the tools used than is usually realized. However, if he is wise he will limit his selection to the kinds suited to his various needs, avoiding freaks, and above all, choosing the highest quality. All cutting or edged tools should be kept in good condition, cleaned after use, sharpened as needed with a good file, and greased before being put away for Winter.

As indicated, only first quality tools should be purchased. These are made of forged steel, in one piece, or if two metal pieces are joined, they are hot riveted together. The handles are made of fine quality ash or hickory and the leading manufacturers burn their trademark into the handles, or, in the case of forks, shovels and spades, stamp the metal straps on the handles. The price of finest quality tools may be rather higher, but as they are made to last, they are cheaper in the end.

Cheap tools are frequently stamped out of thin gauge sheet metal, and the parts that are cold riveted often work loose. The handles are inferior and likely to break while the manufacturer's name is rarely indicated anywhere. Such tools are shunned by all good gardeners.

The amount of ground available, the type of gardening to be carried on and who is to do the real work largely determine the tool equipment needed. For the average home garden possessing some shrubs and trees, some Roses, a perennial border and perhaps a small vegetable plot, not so many different tools are required as are used on large estates where there are greenhouses and extensive hotbeds and where vegetables are grown in large quantities. The selection of tools here given is ample for the average garden.

For the preparation of the ground, one usually needs a spading fork, a spade and a shovel. The type of soil determines which of these is most suitable for digging or grading. Two types of standard sized spading forks are available, one with flat tines suitable for ordinary soil, the other square-tined, known as an English digging fork, best adapted to heavy soils.

A spade or a shovel (one should preferably own both) is necessary for digging holes, excavating for a pool, making a hotbed or rock garden, mixing soils and the like. When buying a spade, choose what is known as a nurseryman's spade with a half or three-quarter metal strap carried up the handle. The best for the home gardener is one made of molybdenum steel with a Moly-D handle, as it is light in weight. Be sure that it has a "step" on the top edge, either a metal strap riveted on or the edge turned over; such a "step" saves the shoe sole and is easier on the foot.

For preparing seed beds, etc. a good steel rake is needed, either with level head or the round bow type; this is mainly a matter of preference. Rakes are made with either straight or curved teeth and in varying widths, but the curved teeth are more efficient. The average rake has 14 teeth, but for a woman one with 12 teeth is preferable.

A fair assortment of cultivating tools is required and all important is the ordinary garden or draw hoe for working between rows or open spaces. For a man a 7 in. hoe is best, but for a woman a 6 in. blade with a shorter handle is advisable. For rather hard ground a narrow forged steel weeding hoe is handy. This features a narrow, heavy blade on one side, the other having two sharp prongs. There are several variations of this hoe. Another essential cultivating tool is the 4-pronged speedy cultivator with sharp tines so turned that they can be drawn through the ground without a chopping motion. If the soil is not hard and not very weedy, this tool permits one to cultivate twice as fast as with an ordinary hoe. With it one can work among closely planted things and even under shrubbery where an ordinary hoe is not so handy.

For surface cultivation among borders and beds or between rows of seedlings, there is, however, nothing to surpass the scuffle or Dutch hoe or a modification of it. This type of hoe is pushed or jabbed and the worker therefore does not step upon the broken up surface. It is the most favored of all hoes among English gardeners. A specially useful American form of this hoe is the Diamond Point, with cutting edges on both sides. For breaking up a surface beaten hard by rains it is invaluable, but where small plants are close together, the 4 in. Dutch hoe is without a rival, while among seedlings or in the rock garden, the 2 in. English "spud" is ideal.

For heavier work in the vegetable garden a hand cultivator with either three or five adjustable prongs is available. When sowing vege-

table seeds, the heart-shaped or Warren hoe is useful for making drills while the seed can be covered with the two "ears" on the upper part of the blade.

For digging out heavy weeds or brush and briars or for digging up hard ground around shrubbery in the Spring, a light shank mattock hoe is the best available tool.

In the maintenance of home grounds, the lawn mower figures largely. This should be of standard make, with ball bearings, and not too light. If fitted with an iron roller, so much the better. A collecting box is highly desirable. Another essential for lawns is the brume rake with flexible steel fingers; this is much superior to an iron or wooden rake for keeping the lawn neat and for cleaning paths. A half-moon turf edging tool is desirable for trimming the edges of grass from time to time. It should be kept sharp so that it cuts the grass and soil clearly.

For digging out weeds on lawns a dandelion weeder is valuable, but a small steel bar, somewhat like a screw driver, with a hole at the base, is now available for applying acid to such weeds.

Two pairs of pruning shears come in handy. One should be of large size for heavy work, while a smaller pair can be used for small twigs, cutting Roses, shrubs or other hard stemmed flowers. Pruning shears offered at low prices are never worth notice; they are not sharp and quickly get out of order. Good pruning shears are fitted with strong springs that will cause them to open after cutting; the Rollcut is a desirable tool. A pair of hedge shears is also needed for hedge trimming and clipping around grass where the mower cannot reach.

For tree trimming a pruning saw will be needed.

For transplanting the home gardener needs one or two trowels and these should be of best quality forged steel. The large pattern with a 6 or 7 in. blade is most generally useful. A small pattern is handy for moving smaller plants, while a narrow, long bladed trowel can be used for seedlings and bulbs, the latter also serving as an effective weeder in the rock garden.

If there is a vegetable garden of some size, a wheel hoe is indispensable, and it is advisable to buy the combination type with attachments that will permit hoeing, cultivating, furrowing, hilling, raking and seed sowing.

In addition, most gardeners will appreciate having some small hand tools for close cultivating and weeding. Small, short-handled

hoes, forks and cultivators are sold by garden supply stores, but make sure they are best quality forged steel; many of such tools offered cheaply are mere gadgets not worth carrying home.

For fighting pests a small hand duster and a small hand sprayer should be in every garden outfit. A two gallon pneumatic pressure sprayer will enable one to take care of the spraying of shrubs, small trees and the various small fruits and vegetables. For tree spraying it is better to secure the services of a professional man who has a power outfit.

A wheelbarrow will surely be wanted, or better still, two. For carrying leaves, weeds, brush and other material, a light wooden barrow with removable sides is useful, but for heavy work like carrying soil, stones and sand, a workman's metal barrow is desirable.

Another highly valuable piece of garden equipment is a plant food distributor. This is available in sizes ranging from 12 in. up to about 36 in. wide. It can be used for distributing commercial plant food on lawns or in the vegetable garden; it can also be used for sowing grass seed.

Another essential is a watering can, preferably one with a long spout and two roses, one for fine sprinkling.

A stout knife for dividing perennials and other purposes, a good garden line to ensure straight rows, stakes of all sizes, raffia for tying and labels of various sorts will all be needed. A strong basket for carrying the various small tools and other oddments also proves useful.

Gloves are needed when pruning Roses and thorny shrubs and for handling stones and pulling large weeds. There is a special garden glove made of sheepskin, tanned so that the tallow is retained in the leather. This glove is light and flexible and keeps the hands in best of condition. It can be used for all garden work except for handling small seedlings or pulling tiny weeds. Heavy, loose fitting high shoes are desirable for all garden work, rather than low shoes, sneakers or pumps. For rainy weather, waterproofed hunting boots are admirable. In cold weather wear heavy woolen clothing and woolen hose.

Aside from the standard sized tools mentioned, one may obtain a large assortment of smaller sizes suitable for women and children, all available in first quality forged steel.

When buying garden tools, patronize a retail seed store or a hardware store that specializes in high quality garden tools. Avoid the

cut-rate store. If your local stores do not stock what is required, consult the catalogs of the leading seedsmen, most of whom list garden tools and supplies of the best quality.

It will be seen from the foregoing that the essential tools needed in a fair sized garden, especially where vegetables are grown, are: Spading fork, spade shovel, steel rake, lawn rake, draw hoe, Dutch hoe and one or two other pattern hoes; prong cultivator, lawn mower, lawn edging tool, pruning shears, pruning saw, hand trowel and hand fork; duster and sprayer for insecticides; wheelbarrow, watering can and strong knife. Another essential requisite is sufficient hose for watering and reel for same.

Other equipment the average gardener has good use for when the space warrants, are: Sprinklers, either portable, overhead or revolving type; fertilizer distributor, garden line, lawn roller, combination wheel hoe and cultivator, and grubbing mattock and axe for land containing many rocks and tree stumps.

There are, of course, numerous other tools of lesser or greater importance, which the gardener may feel the need of as he gains experience. The beginner, however, should not be led into buying "fancy" tools and "gadgets" without "weighing up" their good and bad points. Some tools that work well in light, sandy soil, are hopeless on heavy or stony land. The character of the soil should govern one's selection of cultivating tools. On very light soil, a fork is a poor tool for digging, a spade being far more effective; and on stony land, a fork with close prongs is apt to be troublesome.

By carefully inspecting the stock of a seed store handling tools, or reading the details given in the catalogs of such firms, one may readily make a selection that will prove serviceable.

If funds are short it would be advisable to buy tools only as wanted; the experience gained in the use of a moderate supply will help one considerably in making additional purchases.

As there are so many tools of various manufacture for the one purpose, and these are so closely alike, to avoid confusion, no illustrations have been used in this chapter. It is better to examine personally the garden tools offered by your nearest seedsman or consult his catalog.

GARDEN FURNITURE

By RALPH O. BUCK

Choice of Wood—Tools—Suitable Types of Garden Furniture—Various Joints and How to Make Them—Paints and Stains—Tarring or Creosoting Timber—Wall Panels and Trellises—Rose Arches—Garden Arbors—Pergolas—Rustic Furniture

THE home owner can add materially to the beauty of his surroundings by the judicious use of trellises, arbors and similar garden structures, made of wood. Even the more elaborate pieces can be built at a surprisingly small outlay of money for material. In any work of this sort, the labor cost is the big item, so if the work is done by the home owner himself all of this is saved.

CHOICE OF WOOD

The material, however, must be of good quality as articles of this type are exposed to the weather the year around and frequently have posts buried in the ground. Some good weather resisting wood, such as Cypress, Redwood or Southern Pine, qualifies admirably, and generally one or more of these woods are obtainable at local lumber yards. Stock sizes of material should be used wherever possible as this will greatly reduce the cost of material. A bit of figuring when you lay out your pieces will prevent cutting to waste in length also.

TOOLS

The construction of garden furniture and structures is comparatively simple, so anyone with a fair knowledge of the use of woodworking tools can successfully build most any of them. Your tool equipment need not be extensive nor elaborate; a saw, hammer, chisel, square, bit and brace and perhaps a level, will carry you a long way, especially if you can borrow some occasionally required tools from an indulgent neighbor.

SUITABLE TYPES OF GARDEN FURNITURE

Garden furniture must be of a type that is suitable for the place where it is to be used, a point that is all too frequently overlooked. A formal garden, for instance, requires a rather stately and dignified type of structure. Classic columns, formal lines and rather massive construction are suggested. On the other hand, an informal garden with irregular beds of old fashioned flowers is an ideal setting for the rustic or simpler and less formal type of structures.

Gardens should not be over ornamented with structures; a few well placed and properly designed pieces are all that are required or will even look well. Ornate structures are never in good taste in any type of garden and should be avoided if you would have an attractive garden. The gingerbread type of ornamentation on structures is equally unsuitable and greatly detracts from any structure. Let simplicity be the keynote.

VARIOUS JOINTS AND HOW TO MAKE THEM

The joints commonly used in garden structures are simple and easily made. As the work is to be painted, slight inaccuracies and imperfections which do not detract from the strength but only from the appearance, are permissible, for they can be effectually concealed with

putty before the piece is painted.

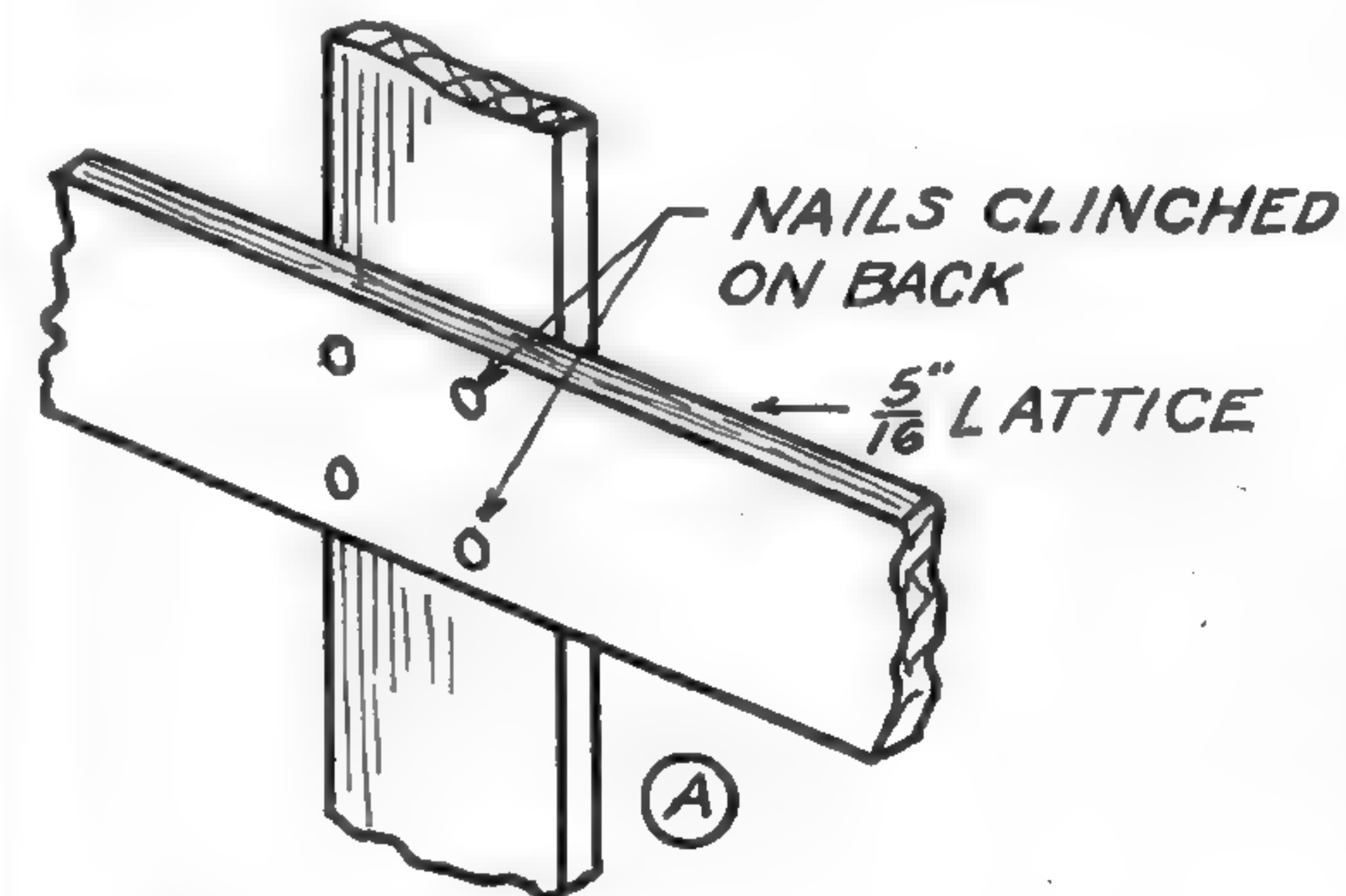
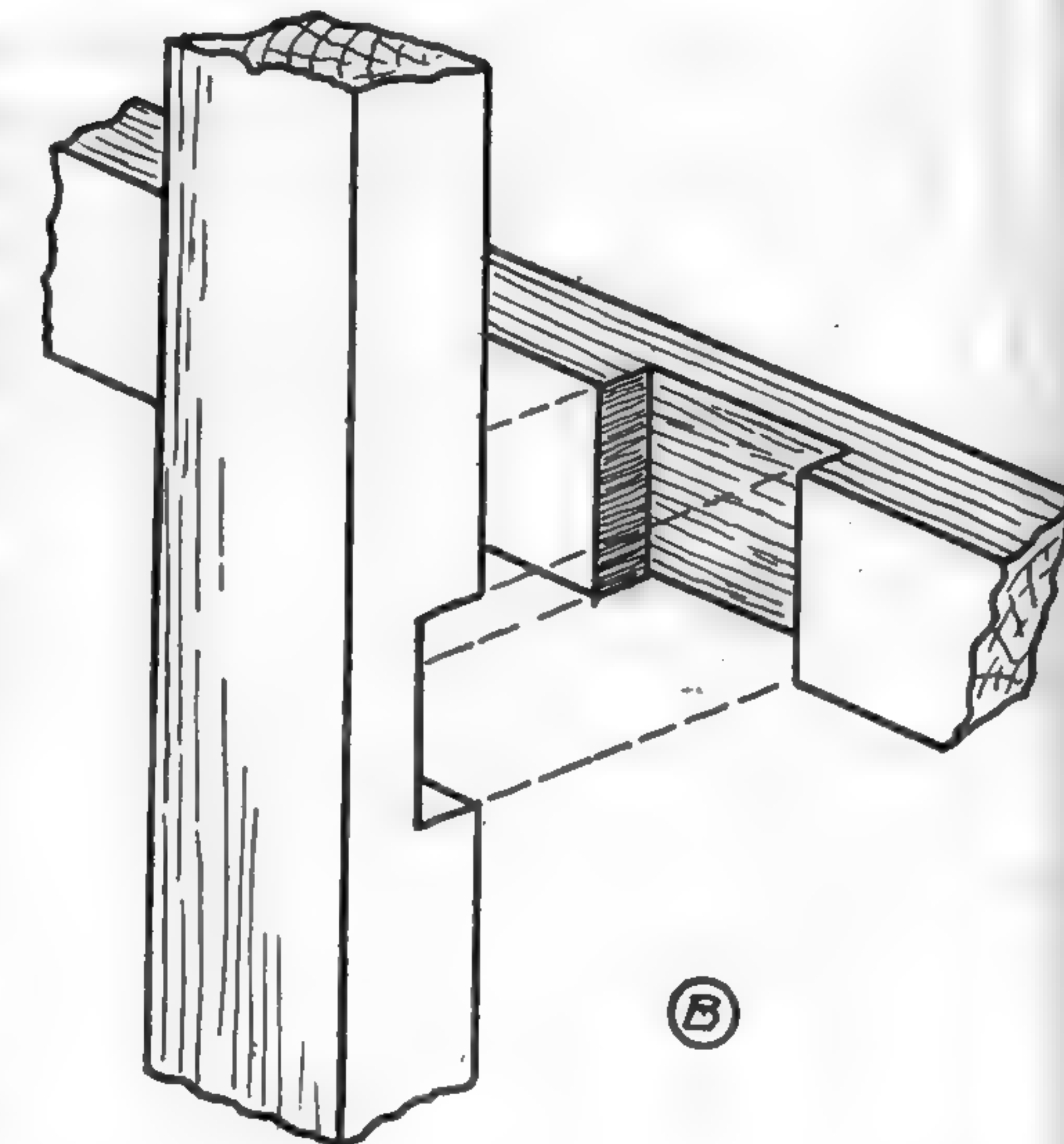
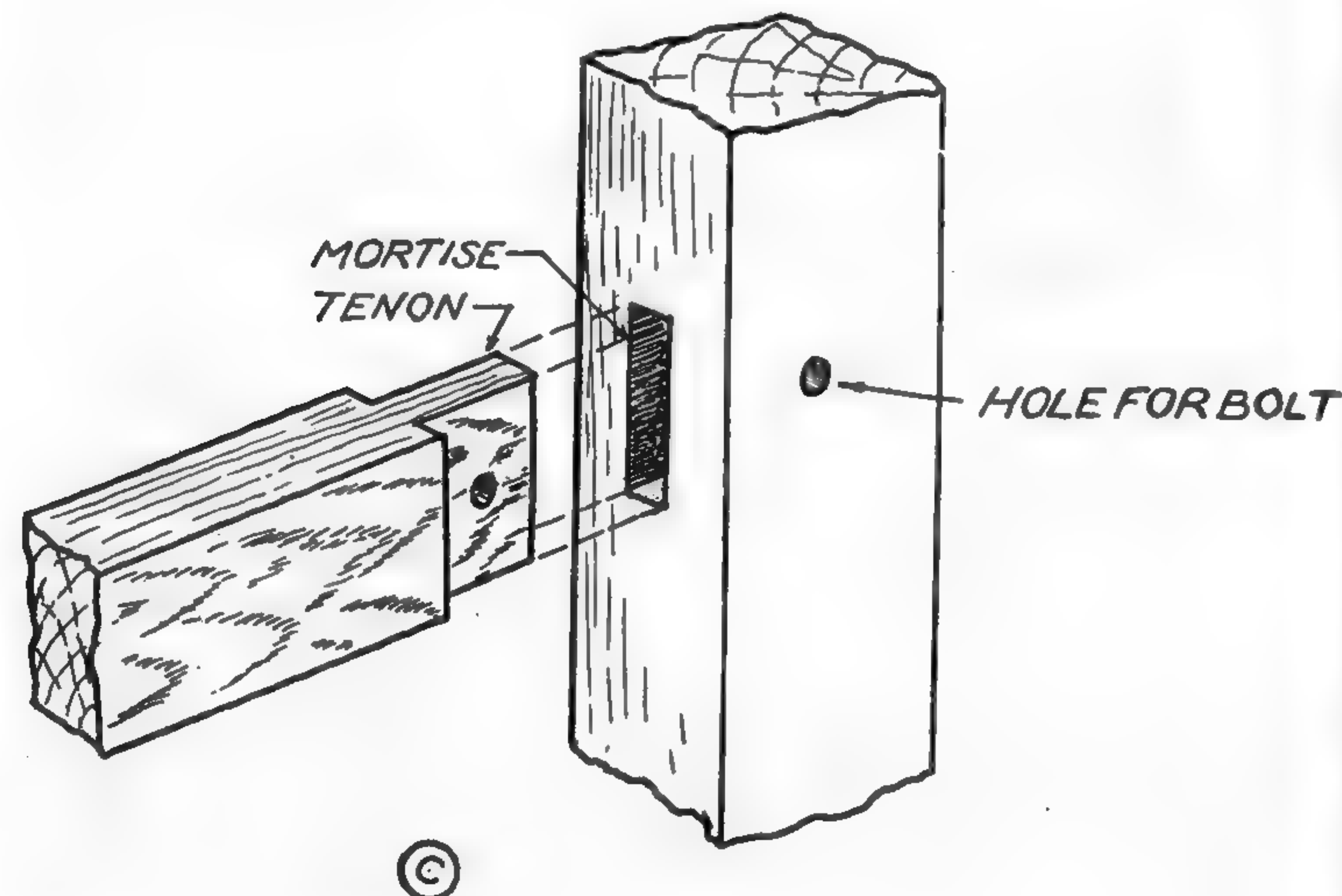


Figure A shows how two pieces of lattice are joined at right angles. Butt joints of this type are fastened with 2d. nails and the nails are securely clinched on the back. This type of joint is used largely in the construction of lattice panels.

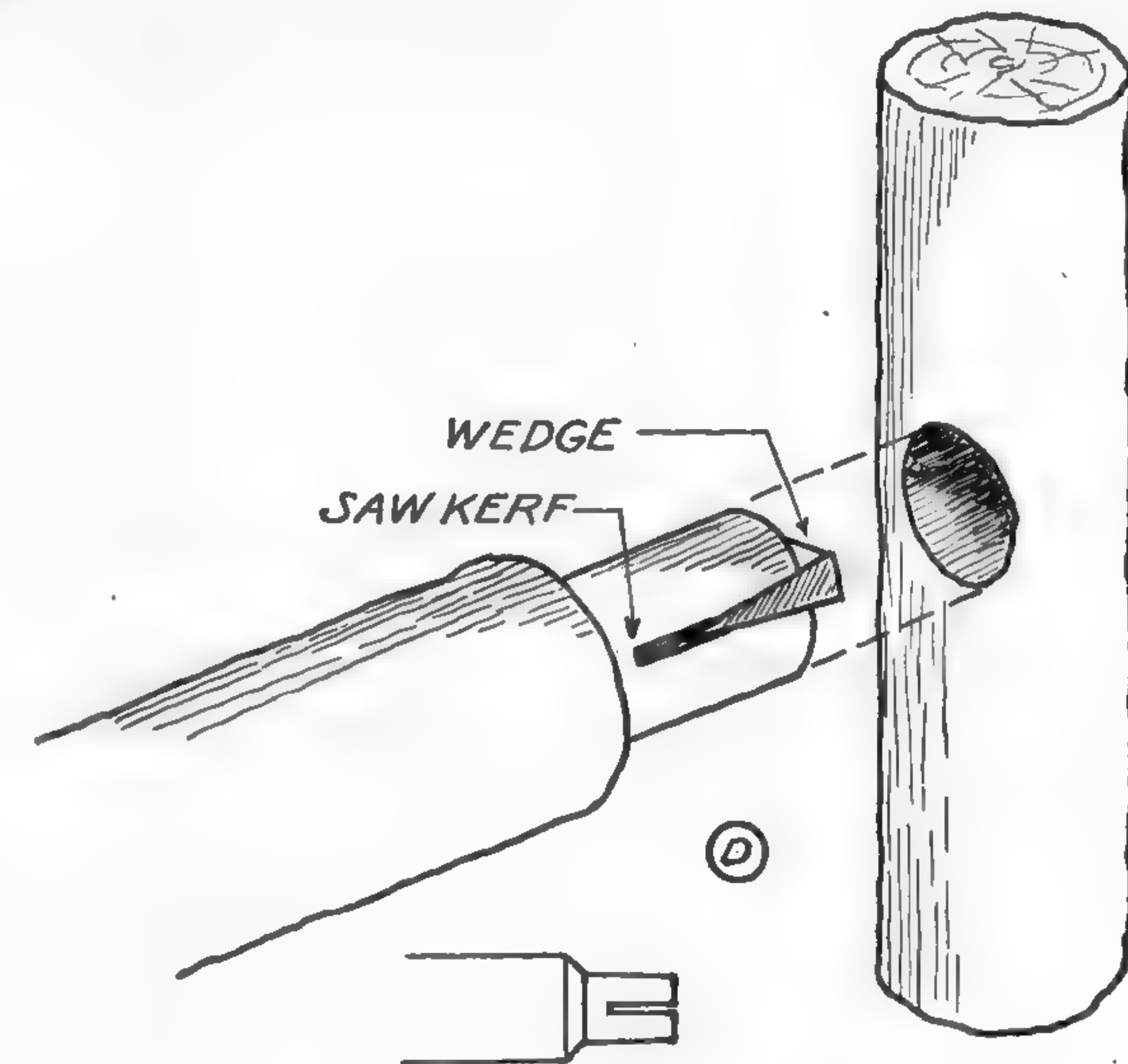
The joint in Fig. B is a half-lap and is much stronger and generally better looking where heavier material is used. The surfaces of the two pieces are flush, making it easier to paint also. The construction of this type of joint is not difficult. Simply lay the pieces

into position and score lines with the point of a knife. The line is then used as a guide for the saw. Care must be taken, of course, to have the pieces square when scoring the lines, and the saw kerfs must be made inside the lines so that the pieces will fit snugly. Nails, screws or casin waterproof glue are used to secure the joint.

The "old reliable" mortise and tenon joint is shown in Fig. C. This joint may be made to go through the piece or "blind," as shown, according to the place in which it is to be used, but the latter is usually



preferable on garden structures. This joint is undoubtedly one of the strongest that can be made and is also one of the neatest, but, unfortunately, requires more time and skill than either of the others. For garden structures the shoulders are cut only on the sides as shown, which greatly simplifies the laying out and cutting of the tenon. Lay out the shoulders with a square and knife and make the cut across the grain with a saw. If the wood is at all straight grained it is possible to make the cuts along the grain with a chisel, otherwise a saw must be used.



The mortise is laid out in a similar manner and most of stock removed with an auger bit. The hole is squared up with a chisel. A carriage bolt is used to pin the tenon into the mortise and if the hole in the tenon is drilled slightly nearer the shoulder than it would be if you drilled right through, it will draw the joint together snugly. Waterproof glue may be used on this type of joint but is not generally necessary. Mortise and tenon joints are used to fasten cross rails to upright posts and for similar purposes where the stock is fairly thick.

Rustic furniture requires a somewhat different type of joint. The joint shown in Fig. D is most commonly used for this type of work. It

consists of a round tenon, somewhat smaller in diameter than the piece on which it is formed, but the shoulder need not be cut square; rather a 45 degree slant is best. A slight taper to the tenon is also good. The mortise, of course, is simply an auger hole. A saw cut in the tenon, along the line of its axis, is used to insert a wedge as shown in the sketch. It is obvious that when the tenon is driven into the hole, which has previously been gauged to the proper depth, the wedge will be driven home and the tenon expanded to form a tight joint. A joint of this type is permanent so care must be taken not to insert the wedge until all trial fitting has been done. Another variation of this joint is the omission of the wedge and the use of a carriage bolt or peg in a manner similar to that used for the mortise and tenon joint.

PAINTS AND STAINS

The finishing of garden furniture with paint does not offer much variety. White paint is used almost universally, for it has been proved by experience that no other color presents so pleasing a contrast against green foliage. It is permissible, however, to use bright colors such as red, orange and green on lawn chairs and tables or other portable furniture.

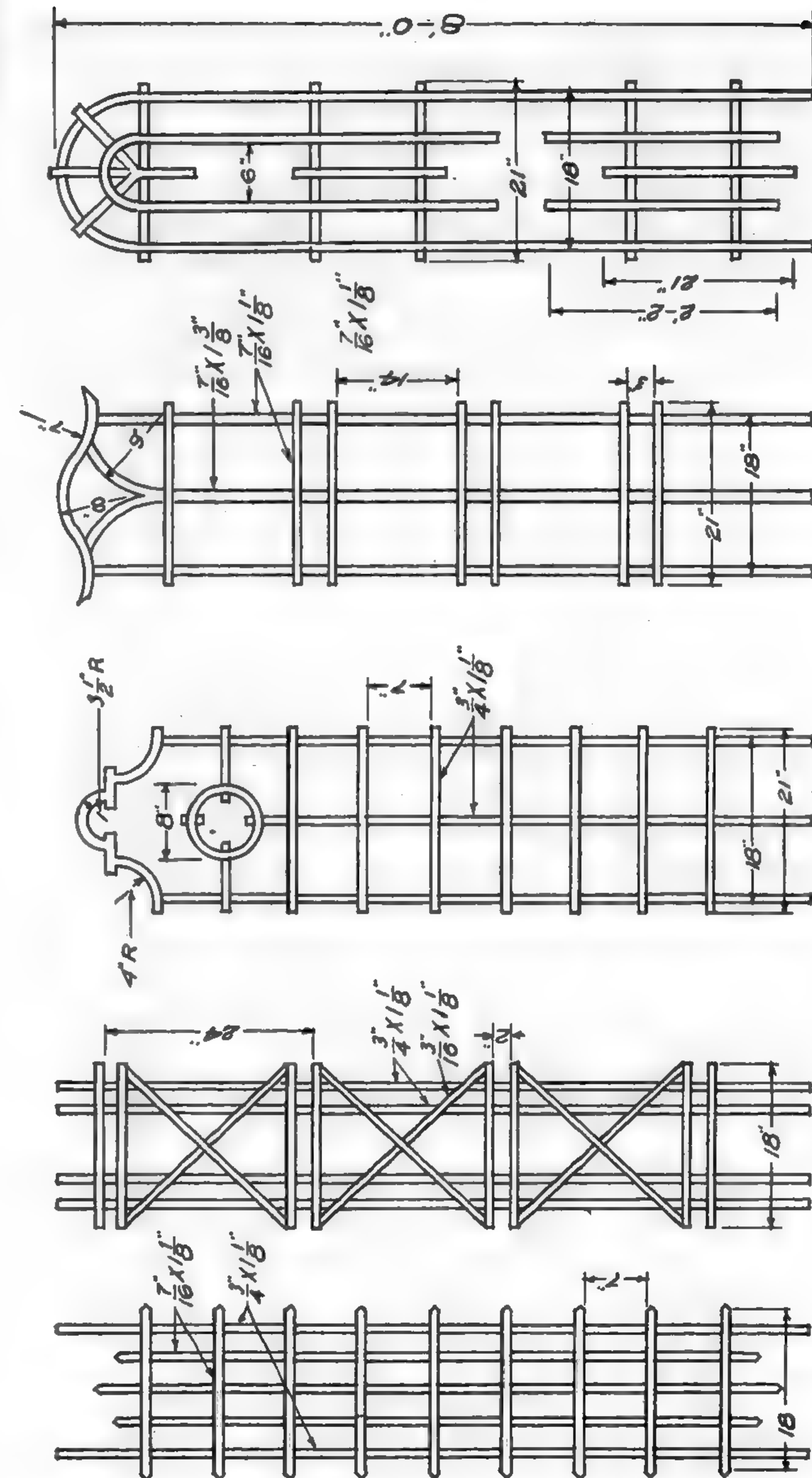
Brown and green creosote stains may be considered as second choice for certain types of fences and background structures where it is desirable to have the structure unobtrusive.

If paint is used the material should be well primed before assembling. A new aluminum paint which levels out very smoothly is particularly recommended for this purpose because of its greater protection to the wood and the depth and brilliancy which it gives to the paint. Of course, a white lead, oil and turpentine primer may be used, but it can hardly be considered as durable.

The reason for priming the wood before assembling is that the surfaces which are in contact as in Figs. A or B have been found to be the first points of decay when left unpainted. The subsequent coats of paint, of which there should be two, apparently seal the joints much better if the inner surfaces have been primed.

TARRING OR CREOSOTING TIMBER

The legs of structures which are placed in the ground should be protected against early decay by tarring or creosoting the portion of the timber that is to be buried. It is especially important that the end



Wall panels and trellises

grain be well filled, for the moisture will work its way up through the pores of the wood and cause the paint to peel for as much as a foot above the ground, if this precaution is not taken.

If the posts are set in concrete this precaution is equally important, for the concrete shrinks away from the post when it dries and leaves a crack which permits the entrance of water. A little tarring around this crack, as well as on the timber itself, would be beneficial no doubt.

While it is obviously impossible to include any great variety of garden furniture designs in the limited space available, a few typical designs are given to illustrate the possibilities. Garden furniture is of endless variety and new and pleasing designs appear in books and magazines every year, so that one need not be limited to the designs given. The fundamental operations and methods of construction are similar in practically all pieces so that no great difficulty will be encountered in adapting some of these ideas to one's use, if the designs illustrated are not suitable.

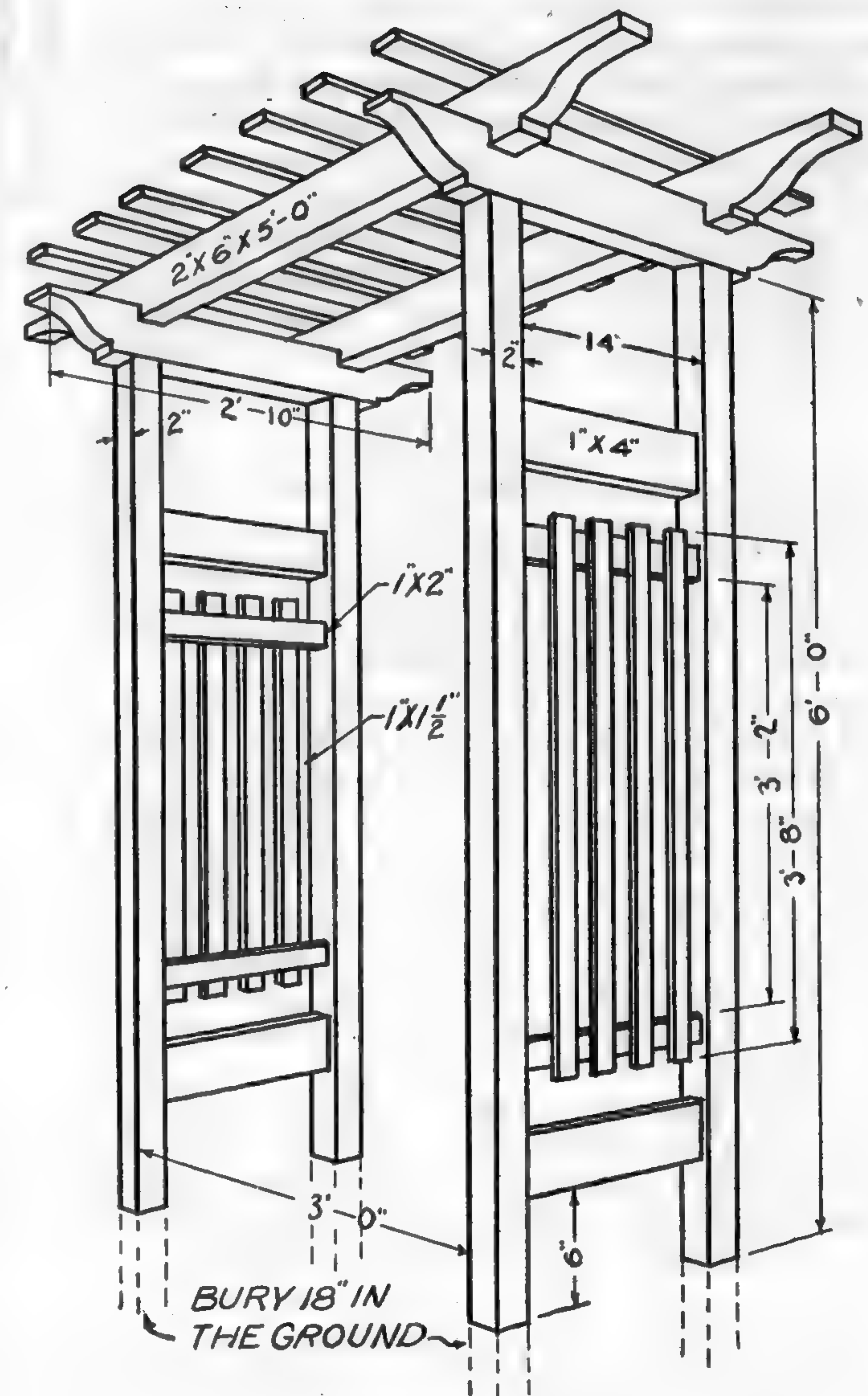
WALL PANELS AND TRELLISES

Wall panels are used to break the monotony of an otherwise uninteresting blank wall space. Brick walls are the worst offenders in this respect, so it is here that panels of lattice are most frequently seen. The panels may be nailed directly to the wall by driving nails into the mortar between the brick. When panels are placed on a wall of a frame building it is necessary to put wood blocks between the wall and the panel to prevent the decay which would result from the siding being kept damp.

Trellises are used in a similar manner to cover doorways and to form screens and backgrounds. Several designs are given on page 481 so that you may choose a type that suits your fancy. Any of the designs may be made up in various sizes and proportions for the purpose intended, as there is nothing sacred about either the size or shape. The sizes given are the ones most commonly used, however. A simple lap joint, secured with clinched nails, is used in all of them. The circular and curved pieces are made up in two or more pieces with the joints occurring over one of the pieces to which it is nailed.

ROSE ARCHES

Rose arches are generally placed over a path or at the entrance to a garden. The sides are enclosed with lattice in some design that will



An attractive Rose arch

form a support on which Roses or other vines may climb. One can scarcely conceive of anything more beautiful or decorative than a white painted arbor covered with blossoming climbing Roses.

The arbor shown on page 483 is an unusually attractive and well constructed piece. The side panels are made up as separate units, securely spaced and braced by the lapped construction of the rafters. The joints between the crossrails and posts are mortised and tenoned as described previously. The short rafters are secured to the posts by means of dowels driven from the notch in the rafter into the posts. A $\frac{3}{4}$ in. piece of broomstick will serve this purpose very well. All of the other joints are nailed.

GARDEN ARBORS

A well located arbor with benches becomes the point of interest as well as comfort in a garden. It need not be covered with vines; in fact, this is not really desirable. Trees and shrubbery make a pleasing and altogether suitable background for this type of structure and are not so prone to draw mosquitoes and other insects. The structure should be placed under a tree to afford partial shade.

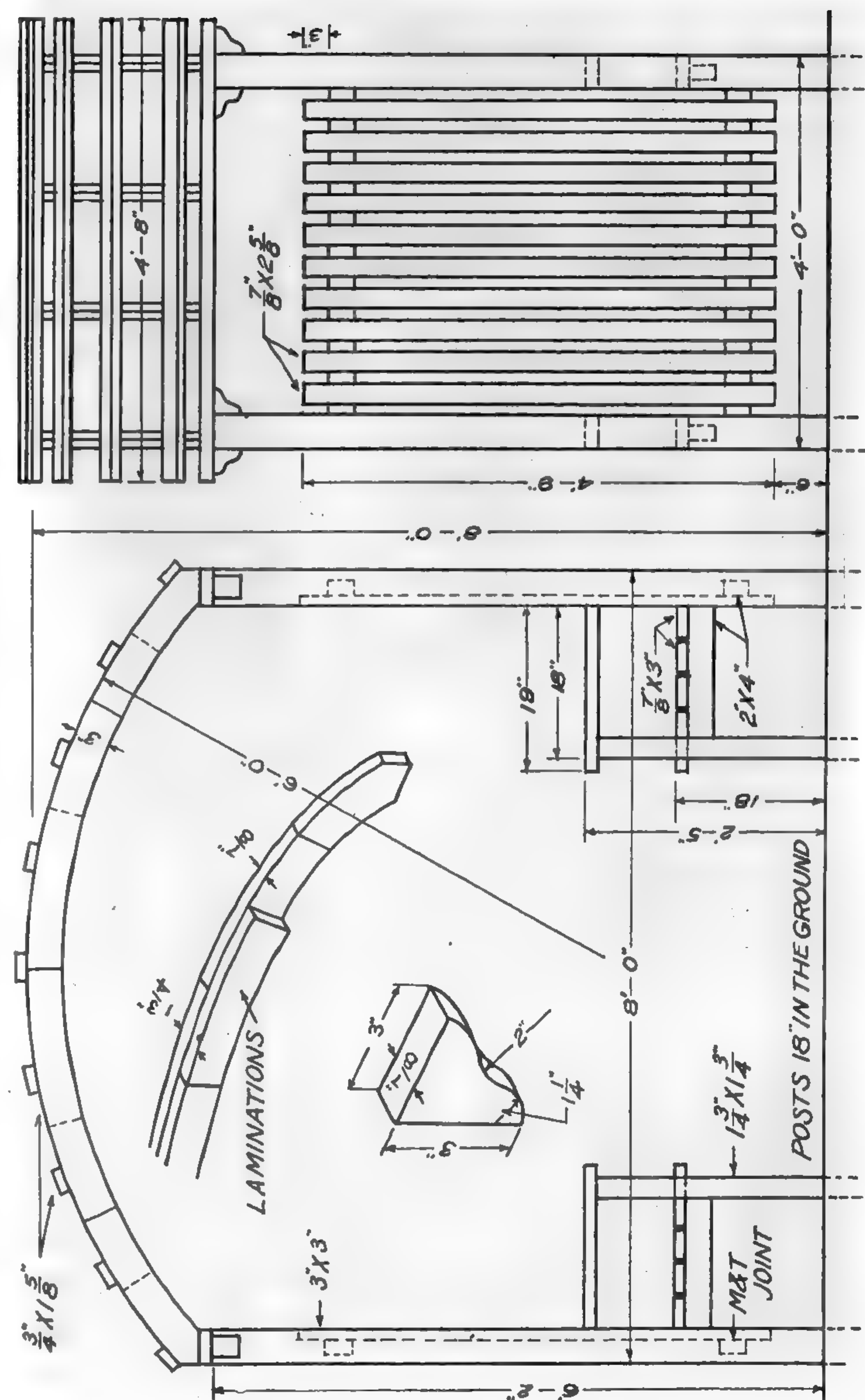
Arbors, of course should be substantially constructed so that when you sit in them they feel and are solid and secure. Light, flimsy construction is never desirable, especially in arbors.

The garden arbor illustrated on page 485 involves the use of a band saw in making the arched rafters. This can be done at the local mill for a small sum, or it is possible of course, to cut the pieces with a turning or keyhole saw. The construction of the arches is of the laminated or segment variety; that is, each arch is made up of several pieces, double thickness, so that the joints occur on one layer at a point where they are covered by the other. A study of the sketch will make this clear.

The arbor has an arch which is laid out on a compass curve, or arc of a circle. A pencil on a string is used to draw the curve on paper so that it may be used as a pattern to transfer the design to wood. A more pleasing design would result if a portion of an ellipse were used rather than a circle but this is more difficult to lay out.

PERGOLAS

Pergolas covering a walk leading from the house to the garden or garage do add to the appearance of a yard. They should only be used however when the distance is at least 50 ft. Vines, especially of the





A pleasant place to rest

flowering variety, should be grown up the sides and over the top to make a shaded passage way. Do not let this degenerate into a tunnel-like affair, however, or it will become a harbor for most of the mosquitoes and other insects in the community. If large open spaces are left at the sides between panels of lattice, this difficulty can be avoided.

The construction of pergolas, which are generally of considerable size and to be classed with Summer houses, are beyond the scope of this chapter. Ample information is available on the subject in books devoted exclusively to garden furniture, so it is suggested that if anything so ambitious is contemplated one of these books be secured.



This settee is 24 in. high and the seat is 17x45 in. Height of seat, 16 in.; arms, 26 in.



For this chair and settee, make the backs 32 in. high and the seats 15 in. from the ground. The seat for chair is 16x16 in.; for settee, 16x48 in.

RUSTIC FURNITURE

The construction of rustic furniture is really quite different from the types previously described. Accurate and definite sizes are usually impossible, for the reason that it is almost impossible to secure identical pieces. Only approximate diameters are possible, and the securing of two pieces of even similar curvature often requires considerable searching and sorting.

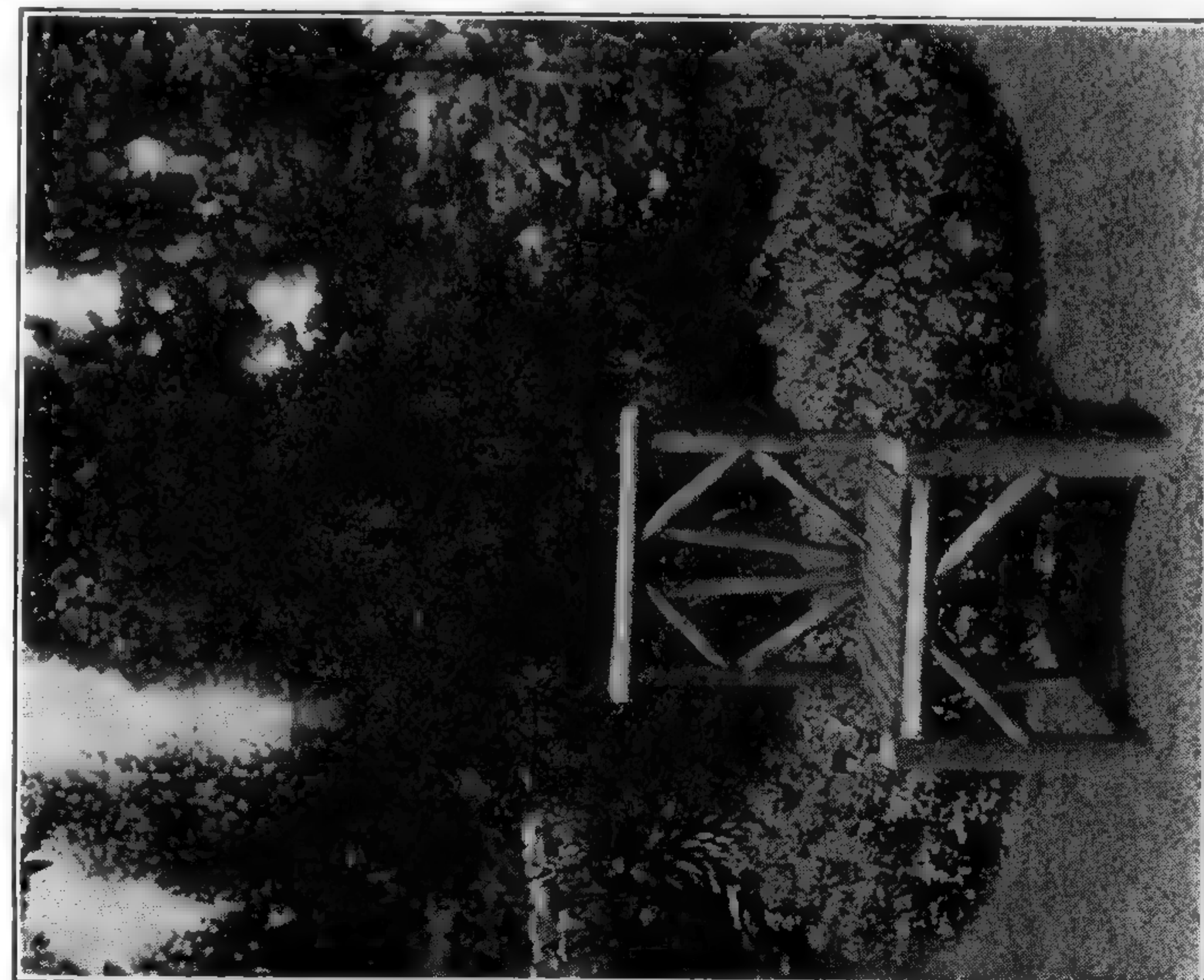
Rustic furniture may be made either with or without the bark. The latter or peeled type, is generally more useful, in the case of chairs and benches, as it is not so prone to soil the clothing of an occupant. Birch, of course, is an exception to this, for its silvery inner bark is not only very beautiful but clean.



This arbor is 6 ft. 6 in. high and 5 ft. to plate. The opening is 4 ft. in width and 30 in. in depth



This rustic well is intended as a point of interest. It is 5 ft. high.



This chair is 34 in. high and has a seat 17x26 in. All diagonal members are fitted and nailed



A miniature bridge such as this may be used across a backyard pool. The size is dependent on the pool

Hickory, Ash, Willow, Birch, Larch and Fir are all suitable for rustic furniture; in fact, any wood from which pitch or sap does not ooze may be used. The wood should be dry, if possible, and if it has been cut in the Winter will retain its bark better.

Nails are used in fastening the smaller pieces together, especially where they are subjected to no great strain, but the type of joint shown in Fig. D on page 479 is used for all of the others. The size of the tenons vary according to the size of the pieces but $\frac{3}{4}$ of an inch is the most usual size.

Peeled furniture can be finished very attractively by either applying spar varnish or more simply and cheaply by coating with boiled linseed oil in which a small quantity of either yellow ochre or red lead has been dissolved.

Illustrations of six rustic furniture projects are given herewith, together with such basic dimensions as are practicable. Such dimensions as are not given can be estimated by building the piece in about the same proportions as illustrated.

Chapter XXXVI

ANIMAL LIFE IN THE GARDEN

By ARTHUR STUPKA

Bees—Toads—Pigeons and Poultry—Rabbits—Larger Animals

AS on a well-balanced farm, so in a well regulated garden, various kinds of animals may contribute in one way or another toward making the venture a success. Many gardeners seem to have the idea that it is disastrous to attempt to raise animals when the upkeep of a garden is the primary objective, but this viewpoint finds no support where the double venture is practiced with expedience. In fact, when carefully regulated, the upkeep of certain animals cannot help but be an asset to the gardener who wishes to obtain the most from his garden plot. Of course, a flock of ever hungry chickens, if allowed to wander into the sanctuary which is a growing garden, will cause inestimable damage. On the other hand, if allowed to roam only over a restricted fenced-in area, they, like the garden, may yield a harvest of their own.

From smallest to largest, some of the animals which should receive the gardener's attention are as follows:

BEES

Whether or not you and your family are fond of honey, bees play so important a part in your garden that they deserve to be considered as valuable garden allies. The initial cost of a colony of bees is not great (about twenty-five dollars for all the necessities); and the aggregate of good derived from this investment justifies at least a trial. Pollinating tree fruits and other plants in a most effective manner, storing large quantities of honey, furnishing an added touch of home industry to the vicinity of the garden, and requiring very little care, the honey bee is worthy of the gardener's consideration. Ranging over considerable areas in their search for flower sweets, these insects require no food except in emergencies. They go about their work, and, contrary to the opinions of certain timid people, harm no one unless molested.

TOADS

With acceptable bird boxes above the garden and toads in the garden, a large part of the trouble normally caused by insect pests is well taken care of. The toad, in spite of its ugliness, is a notable gardener ally. So acceptable are the six-legged pests to this unassuming creature, and so prodigious is his appetite that it is well to learn to cultivate his friendship. Offhand, the thought of flower beds with a toad in their midst may cause one to liken it to a kind of Beauty and the Beast, but in reality the toad-flower relationship is a good one for both parties concerned.

Basing his conclusion solely on the toad's consumption of cut-worms, one authority estimated that one toad is worth twenty dollars a year to the gardener. But how many other six-legged pests it must consume from the time of its appearance in the Spring to the time of its hibernation in the Fall! When one stops to consider this splendid service to the garden, he is prompted to run out and tether the homely and heretofore unappreciated garden toad in the center of his most precious flower bed, appointing the warty one as a kind of caretaker and knighting him for a task well done. A knight seldom rode through a more hostile acre and emerged with such flying colors!

Toads find access to a garden difficult when it is hemmed in too closely by the city. Under such circumstances, it would be well to search for these amphibians in outlying areas, or else dispatch boys to do the searching for you. Once in the garden it might be well to leave a plank lying somewhere in a cool, shaded retreat so that your guests find a satisfactory place to spend the daylight hours. See to it that the ground on which the plank rests is loose so that the toads will have no difficulty in digging into it. While working in the garden, care should be exercised so that the homely ally is not treaded upon.

In Autumn the toads begin their long period of hibernation and it is at that time that they disappear from our gardens. Somewhere, out of reach of the coming cold, they lie buried and will not emerge again until some time after the early robins and bluebirds have returned with their Spring promises.

Do everything you can to encourage the toad to reside in your garden—and harm him not. His mission there is a good one.

PIGEONS AND POULTRY

With sufficient area over which to range and with weather-tight, comfortable quarters, pigeons and poultry, if properly handled,

contribute to the gardener's income. Cooked vegetable refuse from the house and waste from the garden supplement such goods as are essential for health, and, in the case of poultry, maximum egg production. Furthermore, at such times as when the garden is being spaded or plowed, poultry, if allowed to roam over the newly turned ground, does splendid service in devouring injurious insects. Manure from both pigeons and poultry is easily handled and is a rich and valuable source of plant food.

RABBITS

These animals, like poultry, can be kept for the fine meat which they furnish. Also, like poultry, they will consume much of the green waste matter from the garden. The money-making possibilities in rabbit culture have, for the most part, been exaggerated, but a small number of these animals can be kept profitably by the gardener. A rabbit hutch and pens take up but little room and their care is of genuine interest and educational value to the children. Domestic rabbits, like their wild cousins, may do considerable damage to garden crops if unconfined, but this need not occur where proper care is exercised.

LARGER ANIMALS

Pigs and milk goats consume a variety of table and garden wastes and furnish meat and milk, respectively. If properly cared for, both are animals of much cleaner habits than they are usually credited with. Furthermore, with the high prices now being asked for barnyard manure, the gardener would do well to consider seriously the probability of keeping such animals.



Chapter XXXVII

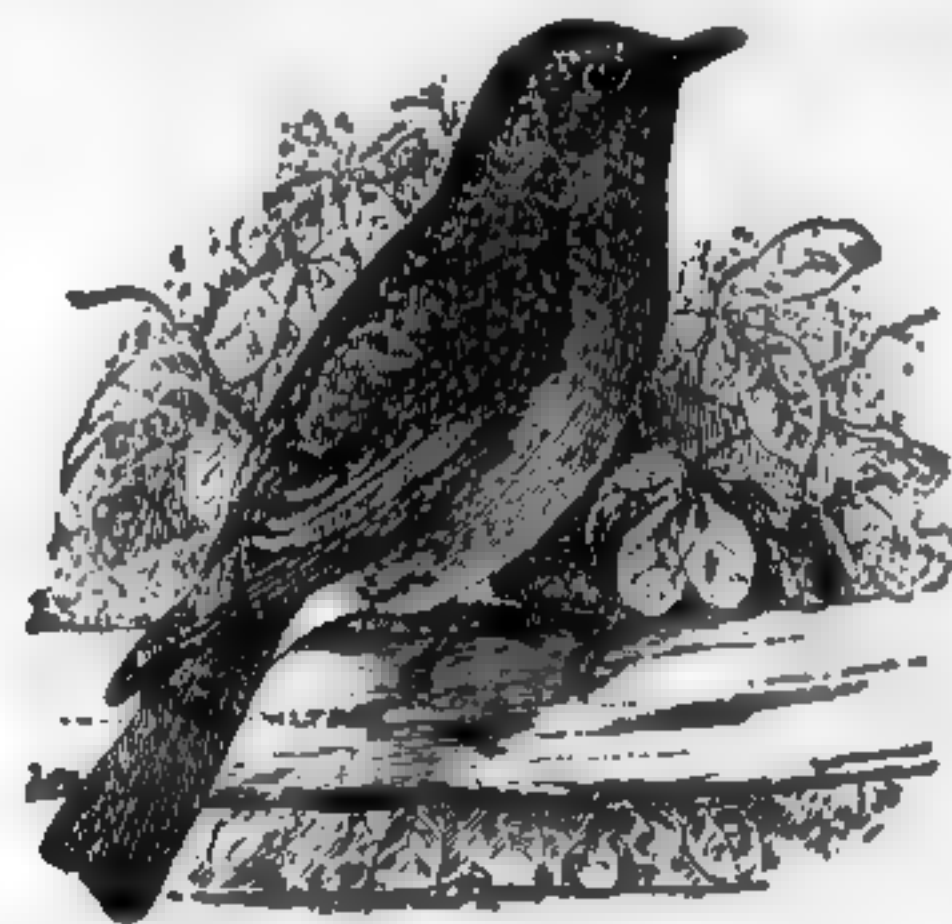
BIRDS IN THE GARDEN

By ARTHUR STUPKA

Bluebird—House Wren—Robin—Catbird—Brown Thrasher—
Phoebe—Flicker—Purple Martin—Fundamentals of Con-
structing Bird Houses—Attracting Birds

BLUEBIRD

OF the half a hundred different kinds of birds which are known to nest in man-made bird houses, there can hardly be a more desirable feathered tenant than the Bluebird. "With the earth tinge on his breast and the sky tinge on his back," what a trim and handsome



The Bluebird

"Typical of all that is pleasing in bird life generally"

Courtesy U. S. Farmers' Bulletin No. 755

spirit he is! Few birds have greater charm or more winning ways. His arrival in late February and in March heralds the birth of a new season. Where nesting sites are available and satisfactory, he and his mate remain to raise two, and even three, broods of young, and in Mid-autumn, when the colorful woods are being stripped of their leaves, he returns with his blue-coated family to make a final inspection of the nest before leaving on the southward migration.

The one fact alone, that 68 per cent of the Bluebird's diet consists of insects, most of which are harmful, marks him as a species

which should be encouraged to remain in or near a garden. If you live in the heart of a big city and your garden plot is close by the noisy trolleys, all efforts to induce the feathered bluecoats to stop and stay will avail nothing. But if you are fortunate enough to have a garden which is not hemmed in by city noises and not overrun by cats or overpopulated by Starlings or English Sparrows, the Bluebirds will require but little prompting. A simple house of the right dimensions, placed 5 to 10 ft. above ground in a fairly open location on a pole, on a dead tree limb, or in the crown of a tree which is not too

dense, will be acceptable. Make the floor area 5 by 5 in.; the depth, 8 in., and fashion a circular entrance 1½ in. in diameter 6 in. above the floor.

A plain board box may be used, but this becomes more acceptable when covered with bark or slabs. Nesting, as the Bluebird ordinarily does, in tree cavities and in hollow fence posts, a bird house which closely approximates such sites is best. Fortunately, this bird is not a particular tenant.

A second nesting of your Bluebirds is encouraged by having a second house in place and ready for occupancy at the time the young are leaving the first nest. Occasionally a third brood is raised. Guard against the house cat, rout the pestiferous Starlings and English Sparrows and clean the little domiciles yearly. Your charming feathered guests will repay this service a hundredfold if you give them half a chance.

HOUSE WREN



The House Wren

"Whose bubbling song is such a joy all through the Spring and Summer"
Courtesy U. S. Farmers' Bulletin, No. 755

Thriving where human beings dwell under fairly congested conditions, nesting in almost every conceivable type of nook and cranny, and being well able to take care of itself, the House Wren becomes a bird of the city as well as of the countryside. Alert, aggressive, and persistent in his Summer singing, he commands attention. Since it has been shown that 98 per cent of its diet is made up of insects, it is well for the gardener to encourage the House Wren. Mr. W. L. McAtee, government expert on the food habits of birds, states that this bird brings

food to its young about once every two minutes all day long.

Although the Wren has been known to take up its abode in almost every conceivable type of receptacle, a rustic or board face dwelling, placed from 6 to 10 ft. above the ground, is most acceptable. The area of the floor should be 4 by 4 in.; the depth of the cavity, 6 to 8 in.; the entrance should be from 1 to 6 in. above the floor, and the diameter of the entrance exactly 1 in. This last measurement is important since it repels the unwanted English Sparrow but allows a convenient entrance for the smaller desired bird. Placing the little dwelling on the side of a building protects the tenants from the house cat.

ROBIN

Known by almost every boy and girl throughout its wide range, the Robin has come to be an American bird favorite. To the city dweller he is a veritable harbinger of Spring. His welcome notes of early morning and late evening have endeared him to all, especially to city folk who seldom hear bird notes other than the harsh chirping of English Sparrows and the squeals of the Starlings. For the most part, his laurels, especially in the urban places, are deserved, and it is well to encourage the Red-breast to tarry and nest.



The Robin

"How cheery his song at the first peep of day"
Courtesy Nat'l Ass'n of Audubon Societies

But encouraging the Robin does not mean the erection of bird "houses." No enclosed structure for him! Unlike the Wren, the Bluebird, and many other species which are known to "move in" where an available and desirable "house for rent" is situated in a satisfactory place, the Robin will not venture into a bird

house. A simple shelf, measuring 6 by 8 in. and placed 6 to 15 ft. above the ground, is best. Put it up under the porch roof or under the eaves of your house—wherever it is protected from rain and from the direct rays of the sun. Outlining this shelf with a strip which rises a half inch or so helps to prevent dislodgement of the nest during times of heavy wind and rain. As mud is used in construction of the nest, it might be well to have some of this material on hand in such places where otherwise the birds would experience difficulty in getting it.

CATBIRD AND BROWN THRASHER

Both the Catbird and the Brown Thrasher are such excellent songsters that they would be welcome additions to any garden. Although both are fond of cultivated fruits, their diet, especially in the case of the Thrasher, consists largely of insects. These birds, like the Robin, will build on a shelf, but this structure must be placed low (2 to 6 ft.) and in a veritable tangle of shrubbery or evergreens. Such a site corresponds to their normal resting places.

PHOEBE

Are you acquainted with the alert and industrious Phoebe? You probably are if your home is in the suburban or rural districts, for

this bird goes more than half way in letting you know he is about. Like his cousin, the Chebec, and like the Bob White, Killdeer, Chickadee, Whip-poor-will, Chewink and others, the Phoebe actually tells you who he is, and makes it persistent and emphatic in addition. By all means, endeavor to have this fine member of the highly beneficial Flycatcher family nest in or near your garden. To watch him capture his insect prey on the wing, to hear his pleasant "phoebe, phoebe," and to be fortified with the assurance that this fine bird is actually a part of your garden is worthy of all efforts you might make to attract him.

In the Phoebe we have another shelf-nester, his favorite location being under a bit of rock outcropping, under a bridge, under an open shed, or under the roof of a deserted and delapidated dwelling. Make the shelf 6 by 6 in. and place it in some protected place at a distance of from 7 to 12 ft. above the ground. The closer you come to the kind of nesting site which the Phoebe would select in Nature, the better chances you will have of attracting this interesting feathered tenant.

FLICKER

None of our native birds seems to have such a liking for ants as does the Flicker, the High-hole, the Golden-winged Woodpecker, or whatever other name you wish to call him. Because of preference for such prey, he is often seen on the ground, sometimes so engrossed, apparently, in his consumption of ants that he will not take wing until one is almost upon him. Of our Woodpeckers, the Flicker is most easily persuaded to enter a bird house, but you must have the right kind of house situated in the right kind of place. Make the floor 7 by 7 in. (either round or square), the depth of the cavity 16 to 18 in., and the diameter of the entrance $2\frac{1}{2}$ in. This entrance should be about 2 in. below the roof of the house. Erect the little domicile on a pole or else place it in a dead tree or against the side of some building. In any case, it should be from 8 to 20 ft. above the ground.

PURPLE MARTIN

Although the apartment type of bird house is unsuitable for the needs of almost every other bird, it is the kind which our sociable Purple Martin demands. So gregarious are these birds that one wonders where they nested before the white man attracted them to his premises with the colony style of house. Starting with a structure

to accommodate six or eight pairs, one can, by adding one or two additional floors, attract as many as 25 or 30 nesting pairs of these birds.

An entrance $2\frac{1}{2}$ in. in diameter opening to an apartment which is 6 in. square forms the unit of an acceptable type of house. Government publications devoted to bird house construction have excellent plans for the making of colony homes for Martins. Paint the structure white, or else stain it if you prefer. Select an open area not too near your dwelling and elevate the little hotel on a pole so that it remains perched 15 to 20 ft. from the ground. Should a stream or a small body of water be near by, your little house-for-rent might prove doubly attractive. Expel the English Sparrows until your Martins have begun nesting duties. After that, your vociferous dark coated tenants will probably be able to guard against any feathered intruder.

FUNDAMENTALS OF CONSTRUCTING BIRD HOUSES

In the construction of any kind of bird house it is well to bear in mind certain fundamental principles.

1. Wood is by far the best material for bird boxes. Almost any kind of easily worked wood will do.
2. Weathered lumber is best. If your bird box is new, put it up in the Autumn so that it may benefit by winter weathering.
3. If your bird box is not of the slab or rustic type, paint it some natural shade of brown or dark green.
4. One room houses, except for Martins, are best. The two or more room house makes for disturbance of the initial tenants and defeats its own purpose.
5. Circular entrances are natural and are therefore best.
6. Arrangement for cleaning the bird box is an essential part of the construction. A hinged top or side makes for easy cleaning.
7. By all means protect your feathered tenants against cats, English Sparrows, Starlings, and squirrels—but especially against cats. A metal or wire guard placed around the tree or pole which supports your bird box is worthy of consideration. Place it high enough so that cats and squirrels cannot spring above it. All cats are potential bird killers and each year the toll of feathered life they take is tremendous.
8. Have some acquaintance with those particular birds for whom you are building the house. A number of good bird books have been written, if your information must come second-hand.

ATTRACTING BIRDS

A bird bath and the right kind of berry bearing trees, shrubs and vines aid greatly in attracting certain species of birds who thereupon become potential tenants of your garden bird houses. Water and food often lure such birds as are migrants to and from the South, as well as such birds as come down from the North to spend the Winter in our climate. The bulk of the latter are consumers of noxious weed seeds, whereas the former subsist to a greater or less extent upon insects which are more or less harmful. The task of attracting birds is therefore one which is not only desirable because of esthetic reasons, but which is expedient because of the sound economic principles involved. It pays in more ways than one.

The late Charles Livingston Bull, naturalist and well known illustrator of wild life, divides such birds as may be attracted to the garden into four groups, as follows:

No. 1—SUET GROUP:

Chickadee
Tufted Titmouse
White-breasted Nuthatch
Red-breasted Nuthatch
Downy Woodpecker
Hairy Woodpecker
Red-bellied Woodpecker
Flicker
Blue Jay
Oregon Jay
Whiskey Jack
Crow
Clarks Crow
Brown Creeper
Myrtle Warbler
Rose-breasted Grosbeak
Hermit Thrush
Winter Wren
House Wren
Starling
Screech Owl



Black-capped Chickadee
"Any side up, without care,
is the label he bears"
Courtesy U. S. Farmers'
Bulletin, No. 630

These birds also eat:

Sunflower seed
Squash seed
Meat
Fat pork
Crumbs

Dog biscuit
Walnuts
Butternuts
Unroasted peanuts
Other oily nuts

A few of these birds will also eat cracked corn and oats.



The Junco, or Snowbird

"Leaden skies above; snow below"
Courtesy U. S. Farmers' Bulletin,
No. 506



Song Sparrow

"One of the most admirable and delightful of American songsters"
Courtesy U. S. Farmers' Bulletin, No. 630

No. 2—SEED GROUP:

Junco
Tree Sparrow
Song Sparrow
White-throated Sparrow
White-crowned Sparrow
Fox Sparrow
Cardinal
Goldfinch
Redpoll
Snow Bunting
Evening Grosbeak
Pine Grosbeak
Purple Finch
Gay-crowned Rosy Finch
Other Finches and Sparrows

These birds also eat almost any kind of small seeds or cracked grains, such as bird seed, millet, etc., crumbs, bread, crackers, dog biscuit, etc.

A few of this group will also eat a little suet, or will pick at a bone with a little meat or fat adhering, but their normal food is vegetable.

No. 3—GRAIN GROUP:

Ruffed Grouse
Quail
Partridge
Pheasant
Lapland Longspur
Shore Lark

Any kind of grain as
Oats
Wheat
Rye
Barley
Buckwheat
Cracked corn

No. 4—FRUIT:

Robin
Mocking Bird
Catbird and most other Thrushes

This is a Southern group. Will eat oranges, figs, grapes and almost any other fresh fruit, also sometimes, bread and milk

The following fleshy-fruited shrubs are known to be favorites with the birds. They are listed in descending order, according to the numbers of birds known to feed upon their fruits, as based on findings of the United States Department of Agriculture:

Raspberry, Blackberry, Elder, Sumac, Dogwood, Wild Grape, Wild Cherry, Bayberry, Blueberry, Mulberry, Pokeberry, Strawberry, Holly, Shadbush, Hackberry, Juniper, Greenbrier, Virginia Creeper, Tupelo or Sour Gum, Huckleberry, Hawthorn, Black Haw, Snowberry, Rose, Sassafras, Spicebush, Crowberry, Bearberry, Buffaloberry, Honeysuckle, Mountain Ash, Wild Sarsaparilla, Chokeberry, Supplejack, Peppertree, Beautyberry, Partridgeberry, Apples, and Silverberry. Gooseberry, Currant, Barberry and Buckthorn, since they are known to serve as alternate hosts of rusts which attack various plants, are not included in the list.

Chapter XXXVIII

BIRD HOUSES YOU CAN BUILD

By RALPH O. BUCK

THE most important considerations in building bird houses are the area, size of entrance, snugness and ventilation. Means for cleaning out the old nest at the end of the season is also desirable. Generally speaking, bird houses should be put up in a quiet, semi-shady location, high enough so that they cannot be reached by cats.

When painting bird houses, avoid bright colors and glossy paints and enamels. Birds are often frightened away because of one or the other of these faults. Green, brown and white seem to be the preferred colors, perhaps because they blend in with the foliage more readily. Gloss paints may be dulled by the simple addition of turpentine.

Remember that birds build their nests where conditions are most favorable. Hanging a few short lengths of string, yarn or bits of burlap in the trees will often convince a feathered family that your location is preferable to that of a neighbor's who does not provide these advantages.

Of all the birds that seemingly enjoy the association of men, the wrens and martins are outstanding. They, as well as several other species, when once established in your yard or garden, will return, season after season, to occupy the quarters you provide and repay your hospitality with their cheery songs from morn to night. However, you must build your house for the particular species of bird you wish to occupy it, as they each have their code of specifications for which they show considerable preference. A table published in Farmer's Bulletin No. 609 by the U. S. Department of Agriculture,* is especially pertinent. A part of the table follows:

Bird	Floor	Height	Ent. above floor	Size of hole	Height above ground
Bluebird.....	5"x5"	8"	6"	1½"	5' to 10'
House Wren.....	4"x4"	6" to 8"	1" to 6"	—"	6' to 10'
Bewick Wren.....	4"x4"	6" to 8"	1" to 6"	1"	6' to 10'
Carolina Wren.....	4"x4"	6" to 8"	1" to 6"	1¼"	6' to 10'
Martin.....	6"x6"	6"	1"	2½"	15' to 20'
House Finch.....	6"x6"	6"	4"	2"	8' to 12'
Red-headed Woodpecker.....	6"x6"	12" to 15"	12"	2"	12' to 30'
Flicker.....	7"x7"	16" to 18"	16"	2½"	6' to 20'

*Note—Pamphlet can be obtained from Bureau of Printing, Washington, D. C.

Wrens are particularly popular little birds because they come early in the Spring and are so friendly and sociable that if one shows them a welcome they will be your happy guests all Summer long. They are not the least bit fastidious about where they build their nest but quickly select a home and move right in. They sing from morning until night as they go about gathering up bits of string, straw and twigs with which to make their tiny nest. They will gladly occupy your bird house if you will provide one that suits their needs.

Figures A to E on page 503 represent a collection of simple wren house designs which fully comply with the specifications that the wren family insists upon. The construction in most cases is extremely simple and quite within the range of ability of a school boy who has had a bit of manual training.

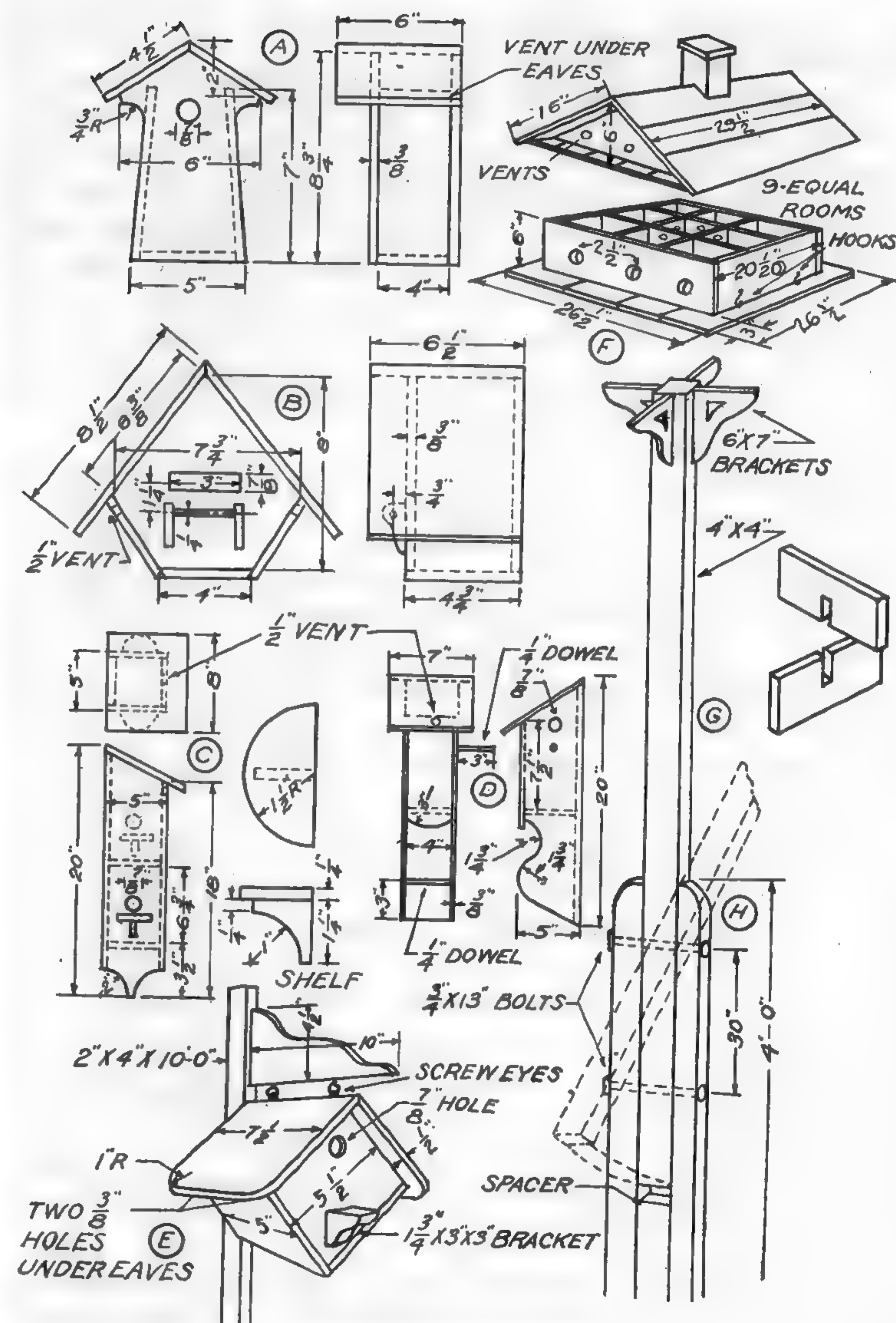
The bird house in Fig. A consists of shaped front and back pieces $\frac{3}{8}$ in. x 5 in. x $8\frac{3}{4}$ in. in size, between which the $\frac{3}{8}$ in. side and bottom pieces are nailed as shown. Notice that the sides do not extend up to the roof but leave a space or vent for the circulation of air. The house is hung from a tree limb or other support in a manner similar to that shown in Fig. E.

The house shown in Fig. B is quite similar in construction, except that the opening is elongated to facilitate the carrying of twigs into the house for the nest. If you have ever watched a tiny wren struggling with a twig to pull it through a $\frac{7}{8}$ in. hole, you will know that this innovation will meet with the entire approval of the wren tribe!

The addition of perches or brackets on wren houses is a questionable practice which is roundly condemned by many authorities because of the danger of sparrows sitting on the perch in front of the entrance and worrying the mother wren on the nest. Others assert, however, that the male wren is quite capable of keeping the sparrows away from the nest and that the perches are of considerable aid in getting the nest material into the house, as well as being of help to the baby wrens when learning to fly. The perches can be omitted without detracting materially from the designs so "let your convictions be your guide."

The flat type of house shown in Figs. C and D is especially suitable for fastening to a building, up near or under the eaves.

If a more elaborate wren house is desired the three-family type shown on page 505 is recommended. A careful study of the drawing will show that the construction is quite simple. The front and back pieces are made first; then the side and partition pieces are nailed between them. Note the vents left under the eaves. The addition of



Wren and Martin Houses

the roof boards and floor complete the house, with the exception of the ornamental solid wood chimney.

The purple martin is strongly social in its habits and lives only in colonies, so a martin house must be of the apartment house variety, containing at least six apartments. The conventional square house shown in Fig. F in illustration on page 503 is always popular with the martins. The construction is quite boxlike, with the exception of the partitions, which are jointed in a fashion similar to an egg tray as shown in Fig. G. In order to provide ventilation, holes are bored into the ends of the roof section and also up through what serves as the ceiling of each compartment. Additional ventilation is provided by the unused center compartment which has holes through its side walls and a large hole through the ceiling.

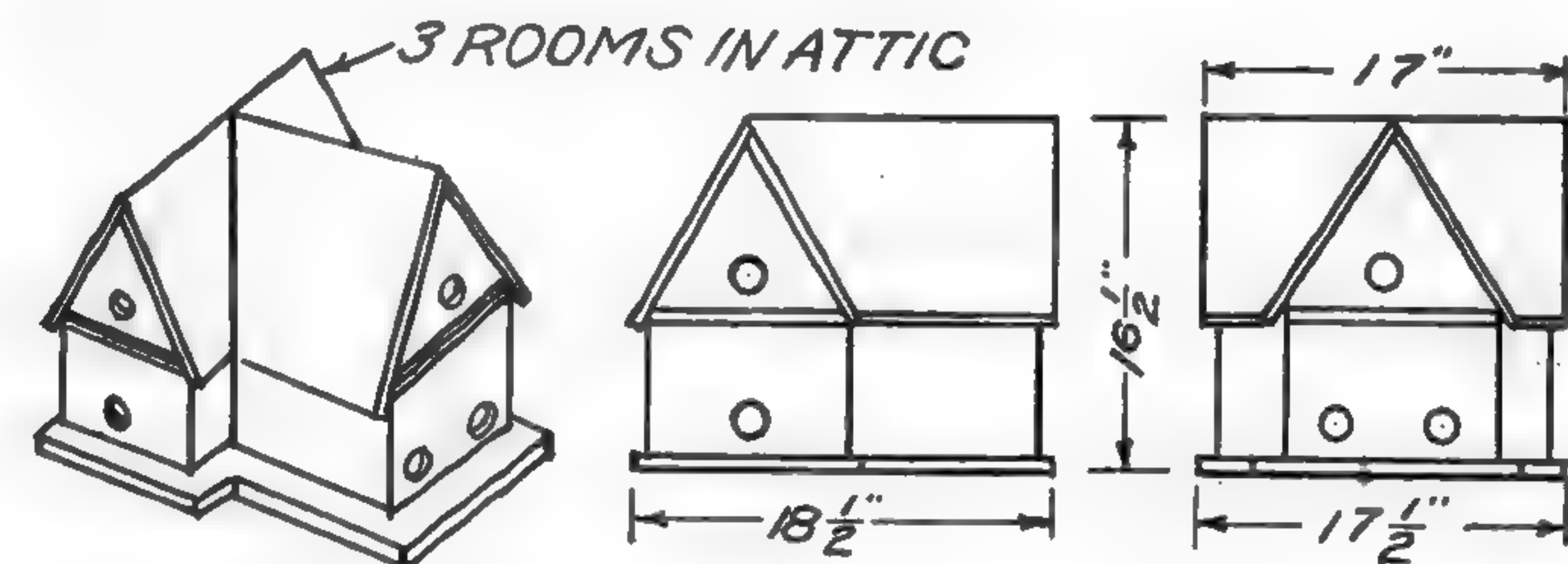
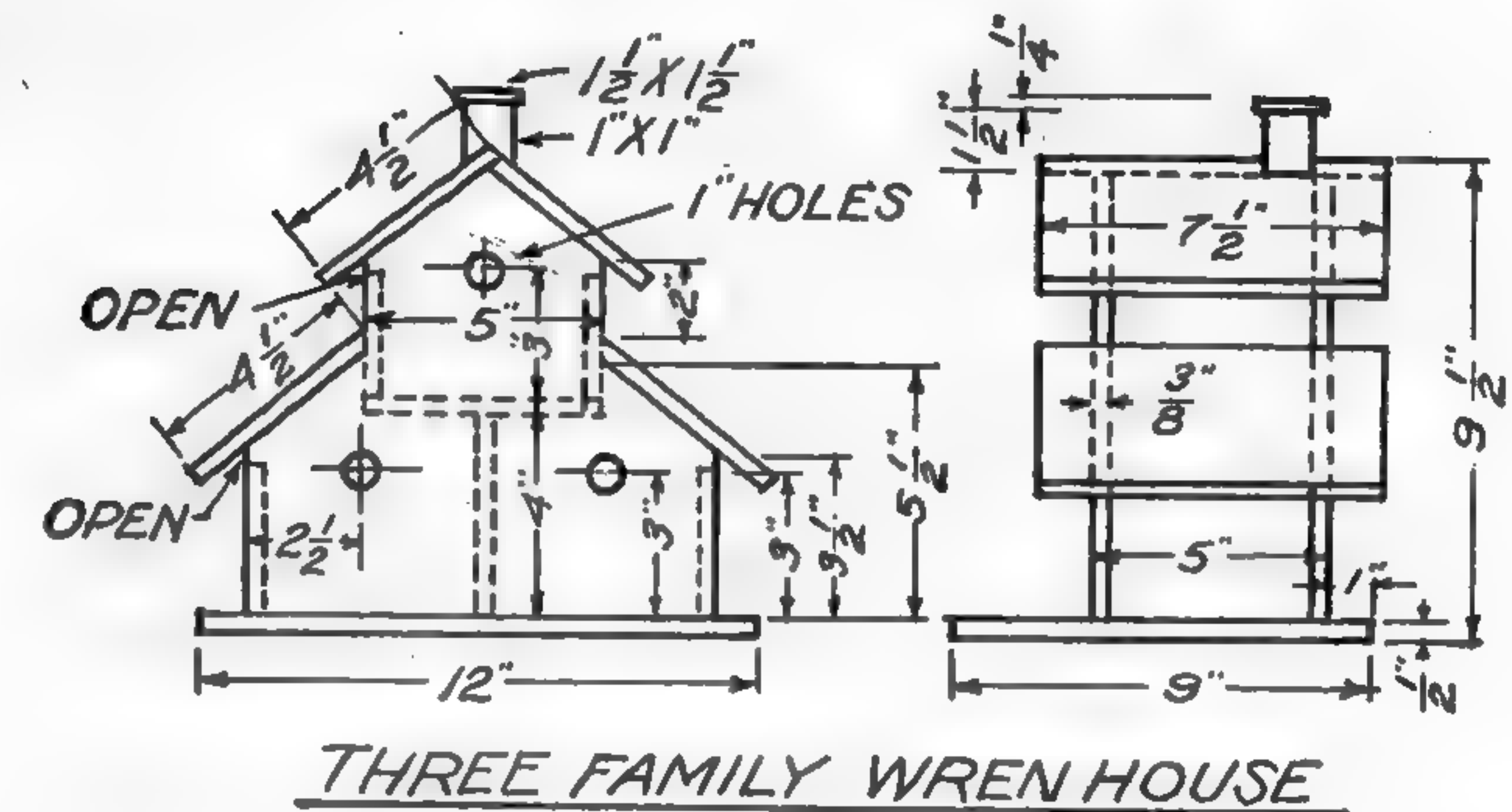
The roof assembly is nailed to the walls which, in turn, are fastened to the platform or floor by means of hooks. The hooks make it possible to gain access to the entire house for cleaning out in the Spring.

Sparrows are always contenders for space in a martin house and will take possession the first thing in the Spring if they are not driven away. For this reason it is advisable to have a martin house readily accessible, either by ladder, or, better still, by mounting it on a pole arranged as shown at "H" so that it can be lowered at will. The entrances to the compartments should be closed with bits of screening in the Fall, after the martins leave for the South, and reopened only when the first one is seen in the Spring.

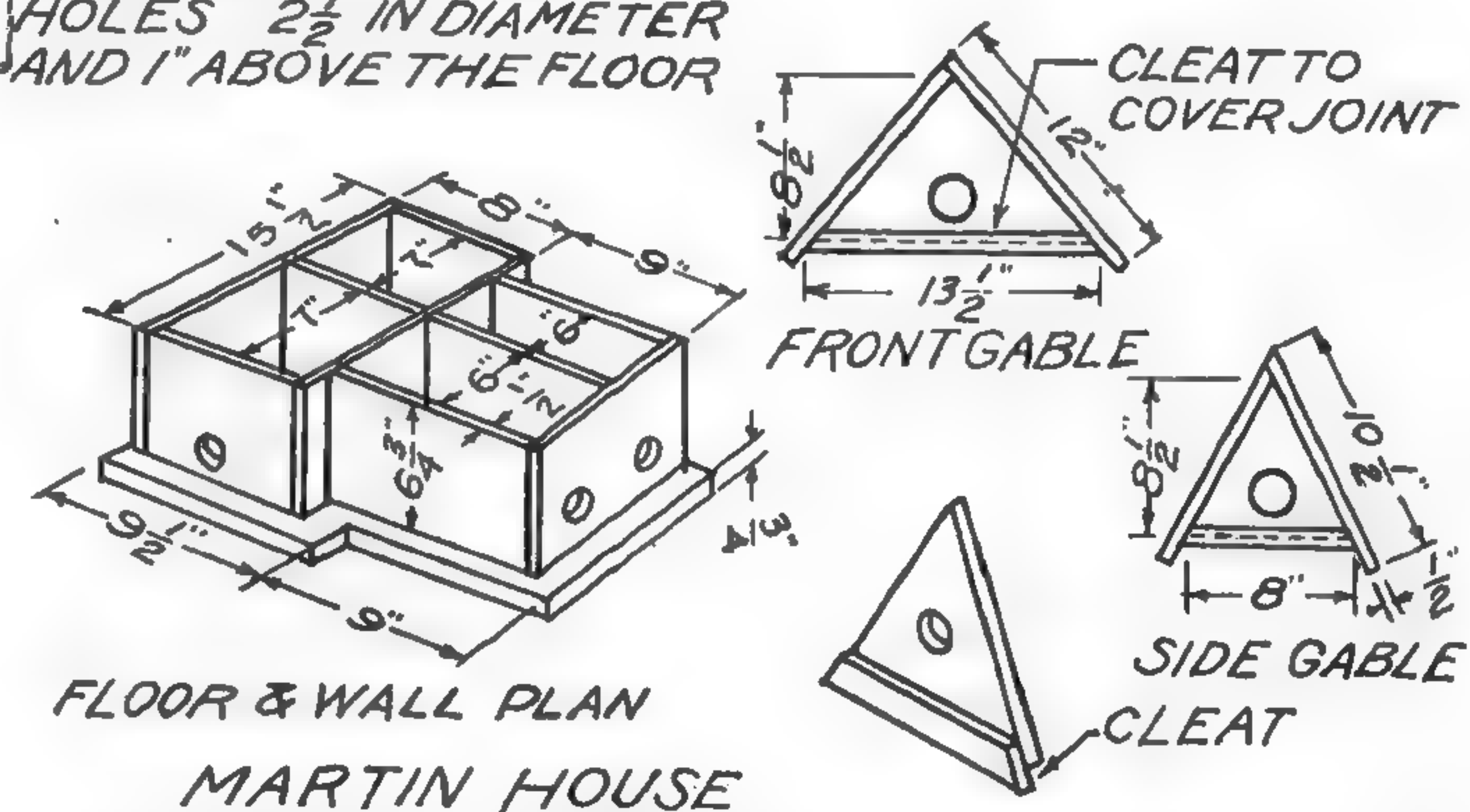
A somewhat more elaborate martin house of seven compartments is shown on page 505. This design may be used as a sort of basis for a scale model house, if desired, by the addition of an outside fireplace chimney, painted windows, doors, etc. Extensions such as porches with railings will not meet with the approval of the birds, however, and should be avoided. The walls are made in two units which are united by nailing and by mounting on the baseboard. The roof sections, shown in detail, are also made as separate units and nailed to the side walls. Make three triangular ends like the one shown in the side elevation so that one may be used for a partition at the center. A cleat is used at the ends of the gables to cover the joint and to secure the roof sections to the walls.

The octagonal martin house shown on page 507 is a much more ambitious project than any of the others described and requires considerable skill as well as a good equipment of wood-working tools.

The floor pieces, which are rather wide, can be made up of several



MAKE ALL ENTRANCE HOLES 2 1/2" IN DIAMETER AND 1" ABOVE THE FLOOR



NOTE - USE SCREWS FOR BASE & ROOF SO THAT THEY MAY BE REMOVED FOR CLEANING

narrow boards butted together. They are held together by the spacer pieces to which the sides are to be nailed. Be sure to have the grain of the latter running at right angles to the floor pieces, however, as shown in the sketch.

The wall panels are beveled on the edges so that they will make a reasonably tight joint at the corners. The edges of the partition pieces give adequate surface for nailing and lend considerable rigidity to the structure. Note that one of the partition pieces runs entirely across the cavity, two of them run from the side to the center and the other four fit into the corner angles formed by the three. The pieces should be assembled in the order described.

The roof forms are set up in a similar manner to that used for the partitions. The squared diagram gives the contour of these pieces but the exact length will have to be determined by trial and fitting with the exception of the one that reaches from side to side or No. 1, which will be the length given.

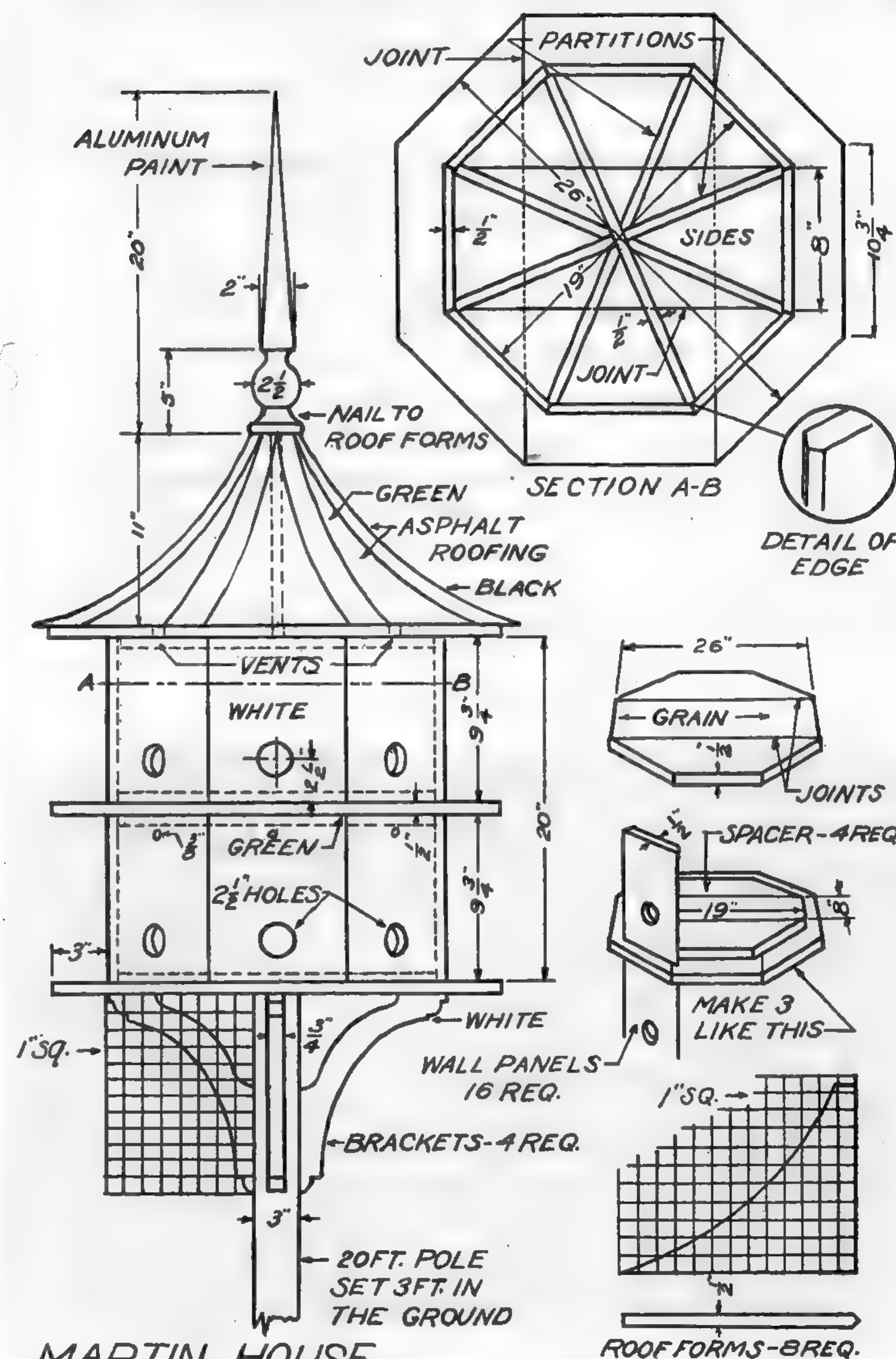
The roofing paper should be cut and tacked from form to form, then the joints covered with narrow strips of a contrasting color as indicated: It is not advisable to substitute metal roofing for the paper unless some insulating material is placed beneath it to prevent the interior from becoming too warm. A 2 in. layer of shavings in the attic portion would be beneficial in either case.

The finial at the top is turned on a lathe and, of course, is very attractive, but a splendid substitute could be made either square or octagonal and obviate the use of a lathe.

No provision for access to this or the martin house described on page 505 is provided as it is quite a simple matter to remove the old nests through the large entrance holes by means of a bent wire hook.

No particular kind of wood is needed to make bird houses, though good sound material is indicated if you expect the houses to last for several seasons. Do not paint the inside of bird houses if you would have them occupied. Sheet metal should never be used for the roof of a bird house because it affords so little protection from the heat of the sun. Birds are often compelled to desert the nest under such conditions and leave the young to die.

The houses described can be adapted to the use of bluebirds, finches and many other species by simply making the specifications agree with those suggested in the Department of Agriculture table, for the particular bird you wish to attract.



MARTIN HOUSE

A 16-Room Martin House

Chapter XXXIX

GOLDFISH IN THE GARDEN POOL

By EDWIN H. PERKINS

Types of Goldfish—What and Where to Purchase—Treatment of Goldfish—The Pool—Plant Oxygenators—Food—Diseases—Breeding—Enemies—Wintering Goldfish

ONE can own an ideal garden pool, become a confirmed pool gazer and then find that pool lacks something. The beautiful Day Blooming Waterlilies close early leaving only foliage behind. As far as the Night Bloomers are concerned the tired business man finds himself unable to enjoy them because of the annoying flying insect life, reared to flying age in his pool. Goldfish furnish the animation to liven dull foliage and make evening pool-side visits pleasurable as well.

TYPES OF GOLDFISH

Among goldfish for pool use we find the heavily scaled, common goldfish, *Carassius carassius*, still a leader today. The larger sizes, called by dealers "giants," and measuring from 8 to 12 in. in length, are demanded. These fish are active scavengers and are further capable of standing much abuse due to faulty management.

The commercial Comet, because it comes in the same colors (red to golden yellow and white—the last called Pearl) is often innocently confused with the common goldfish. The latter has a broad body and short finnage; the Comet is possessed of a more trim body and longer tail. The name Comet refers to the slimmness of this fish and its ability to move like a flash in the water.

The next fish to interest us in the upward scale of prices is the Shubunkin. It, too, is a straight-bodied, single tailed fish, and aside from its pastel coloring could be classed as a common goldfish. The name Shubunkin is translated as *Autumn brocade* and on this fish we find the delicate reds, browns and yellows of Fall and in addition quite an amount of blue. The colors are not patterned in a standardized way. As much variation in color exists as we find on a calico dyed egg. Shubunkins are a cross from a higher type with common goldfish.

Passing from the single tailed type, we come to the Japanese Fantail, a short bodied, deep bellied, well colored fish with a divided or fanned tail. This is becoming more popular each season. Specimens with extremely long finnage are most valuable but not always the most interesting pool fish. They move too slowly.

The Chinese Telescopes which, like the Fantails, can be had in colors from red to calico, have in addition abnormally bulging eyes which seem ready to pop out of their heads. The greater this development the more valuable the specimen. Solid blacks in these fishes are extremely valuable.

The Lionhead with its grotesque head growth, and the Oranda, which is similar to it but with greater and more refined finnage, are not usually seen in other than protected pools. All the above varieties (except the common goldfish) can be had in heavily scaled or transparently scaled varieties. The heavily scaled ones are hardier.

WHAT AND WHERE TO PURCHASE

Goldfish grow so quickly when given a home in the garden pool that one can safely purchase smaller fish and derive much pleasure in seeing them grow. It is not always the best policy to purchase

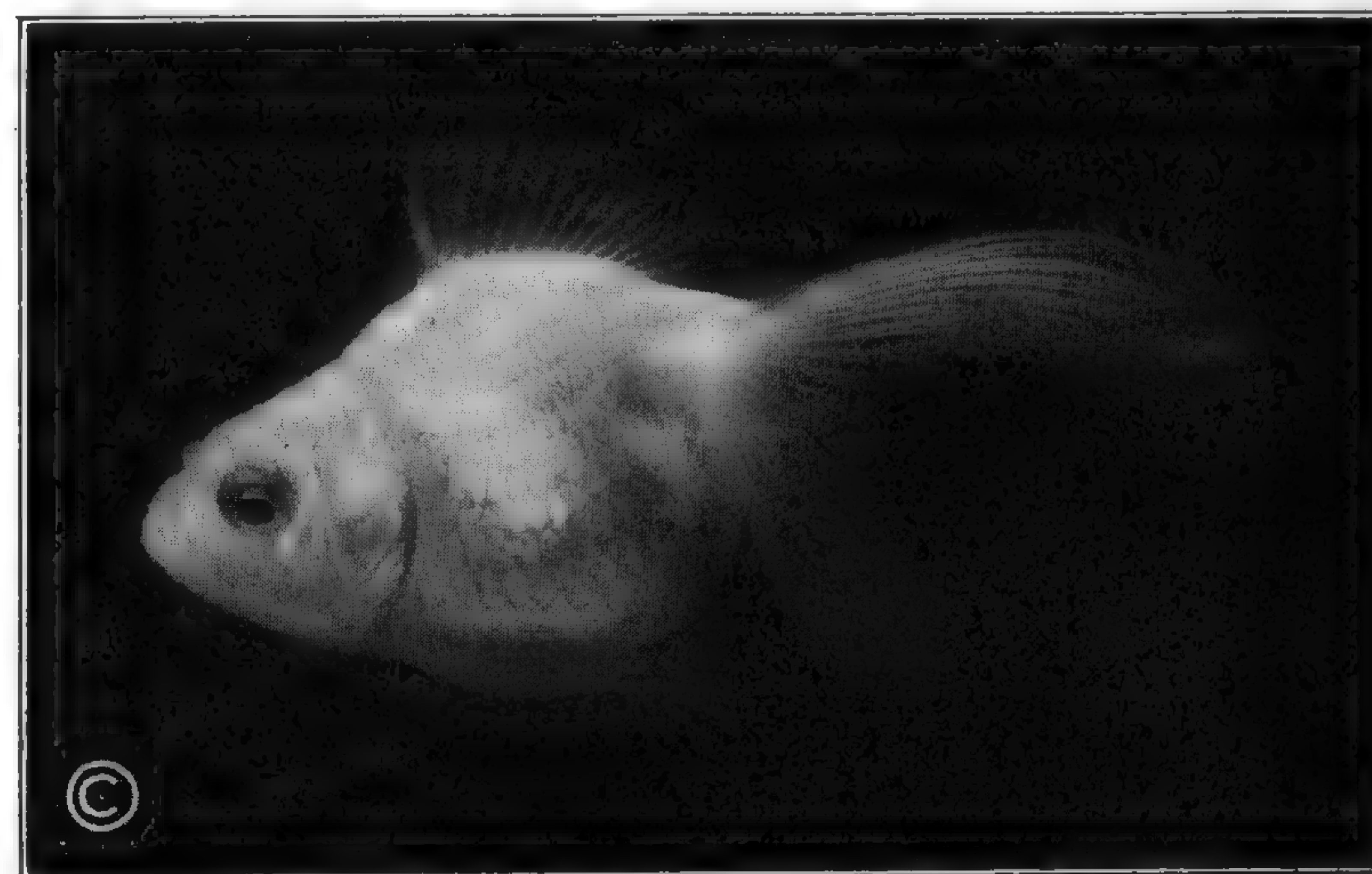


Photo copyrighted by Edwin H. Perkins

A nice commercial Fantail Goldfish

Fishes of this type make desirable friends in your pool. The fish shown is natural size.

the most highly developed ones; they may have passed their prime and need expert attention to maintain them at their best.

A selection can be made from a local dealer if one is available, or, since goldfish are known good shippers, they may be purchased from nursery specialists. These men usually give more value than one pays for, and generally time and route shipments so as to effect good delivery. Each specialist willingly gives advice on the best care of his fish on receipt.

TREATMENT OF GOLDFISH

Should no instructions accompany or precede the shipment of your fish, it may be well to give them a salt bath when received. During transit they may have become bruised or some of their protective coating (a slimy substance) removed, or they may be unbalanced due to jolting. Transfer them carefully with a net or shallow saucepan to a tub of shallow water (at the same temperature as that in the shipping container), to which a level teaspoonful of sea salt has been added for each gallon of water used. After a few hours in this they will have regained themselves and may be safely transferred to an established pool unless they show distinct signs of infection.

THE POOL

A new pool, if not properly seasoned or cured, will cause distress to splendid fish. Before fish are placed in it, it should have been soaked and emptied at least three times. The soaking requires several days between each drain and refill. If water is difficult to obtain or expensive, time and expense can be minimized as follows: In the act of setting, concrete releases much free lime which dissolves in the water, injuring fish and stunting plant growth. A piece of pink litmus paper floated in the pool will turn blue, indicating an alkaline condition. Dilute hydrochloric acid is added with constant stirring until the paper again turns *slightly* pink. If it remains so for 24 hours the pool is safe; otherwise add acid until it does.

The kind of water used need give no trouble. Creek or river water (unpolluted) or spring, well, rain or city waters are satisfactory, unless the selected one is too heavily charged with minerals, sulphur principally.

Allow plenty of space—several small fish to a tub garden, four medium sized ones to a small pool or about a dozen large ones to a

big pool. Fish must breathe freely of the dissolved oxygen in water. This is slightly more than one-half of one per cent (.578%—77 deg. F). They are incapable of separating water into its component gases and show distress at a diminished supply. A one-inch fish should have several gallons of water for its use in a pool; a four-inch one requires more than four times that amount. Its body develops in all dimensions; thus, a one-inch fish gives us the dimensions, $1 \times \frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$, and a four-inch fish, $4 \times 2 \times 1 = 8$, or a ratio of about 1.64.

PLANT OXYGENATORS

Waterlilies and ornamental pool plants are poor oxygenators and the fish are such heavy oxygen consumers that we should plant submerged oxygenators like *Sagittaria gigantea*, *S. subulata*, *S. natans* or *Vallisneria spiralis*. *Anacharis canadensis*, which can be floated on the surface in bunches as received, is also a splendid oxygenator.

When the water is warm—ideal Waterlily bloom time—it is capable of retaining less dissolved oxygen and, since running water retards Waterlily bloom, the fruits of overstocking with fish life will develop in loss of fish. Occasional freshening with a fine spray on the hose washes insect life off the plants—which the fish consume—energizes the fish and replaces water lost by evaporation.

FOOD

A pool attracts flying insect life which comes to deposit eggs in the water where the larva can develop. The chief insect offender, the mosquito, is attracted in numbers. The eggs hatch into the wiggler stage in the pool and then become choice food morsels, few escaping. So plentiful does this food become in Summer that feeding the fish oftener than twice weekly is not recommended.

For this additional feeding one can use any of the standard goldfish foods sold by stores and hatcheries, together with dried shrimp, with perfect success. Bits of boiled fish, chopped clams, crab meat, scrambled eggs, canned shrimp or other similar products used for human consumption, can be given to vary the diet. Oatmeal, either dry or as prepared for the breakfast table, is a splendid food which is relished. Indeed, one does no harm when this alone supplements the diet of larvae found in the pool. The fish seem always hungry; even a crust of dry bread thrown to them is quickly devoured.

Fish learn to follow the shadow of a man in the pool; this leads to the assumption they are hungry and require more food. A fish is



Photo copyrighted by Edwin H. Perkins

A few Telescopes like the one illustrated above (half-size) will make your pool the garden's center of attraction

a great waster of food and quite often too much food is provided. This sinks to the bottom of the pool, ferments and breeds disease. Decaying plants do likewise.

To correct this evil snails are recommended and some of them, quite unlike the garden slug which is also called snail, are quaintly decorative. The common pond snail, *Physa ancillaria*, the red ramshorn or Copenhagen snail, *Planorbis corneus* var. *rubra*, and its brown counterpart, *Planorbis corneus*, as well as the active Australian pond snail, *Isadora proteus*, are splendid scavengers of the egg-laying type. Japanese snails, *Viviparus malleatus*, in addition to being equally ravenous scavengers, reward their keeper with numbers of tiny young, born alive and capable of working so soon as released by the mother. Frog tadpoles soon learn to eat the food intended for the fish and cease acting as scavengers too soon. If you are interested in watching their development, or can endure the noise created by a group of mature "Croaking Carusos" in evening, they are not objectionable additions.

Within the last two years there has been a growing demand for the Japanese Weatherfish, *Cobitisidae*, to correct the excess food in a pool. They too closely resemble a snake to mix with a pretty pool group.

DISEASES

Given the conditions outlined fish will prove fairly disease resistant. The live food found in pools is sufficiently laxative to keep them healthy. We strongly suspect some internal diseases are caused by micro-organisms, but as fish do not lend themselves to experiment like rats, guinea pigs, etc., and no foundation has been established to experiment with, any internal disease and its proper diagnosis and treatment remain a guess. Our troubles come from external diseases, which are now being diligently studied by fanciers.

We must appreciate that even the most healthy pool water contains pathogenes in unobjectionable minorities. When, for some fault, they increase beyond this stage, our fish become infected with small white spots, caused by a small parasite called *Ichthyophthirius multifiliis* or tail rot, in which the tail becomes devoid of all tissue. Fungus, *Saprolegnia ferax*, a wooly parasitic plant of low order, may appear on fish. If for any reason these are allowed to persist at the expense of the host, the fish is soon lost.

These ailments can be treated without removing fish from pools. Add enough weak solution of Potassium permanganate to make the water slightly pink and allow it to act for about 15 minutes. This destroys pathogenic matter. Have at hand a solution made by dissolving one-half ounce of dry lime sulphur in one gallon of cold water. Two ounces of this solution should then be added, with constant stirring, to each 50 gallons of water in the pool. A haze will appear in the water; the permanganate is changed chemically and finally drops to the bottom as a harmless manganese compound. No further treatment is usually needed. *Algae*, the vegetable matter which makes pools appear green, is also ridded in most cases by this treatment.

If after this treatment a fish still shows infection, it can be removed with a net, painted from head to tail with a 2 per cent solution of Mercurochrome and tossed back into the pool with the knowledge at least that it cannot carry or spread disease.

BREEDING

Much pleasure may be derived from breeding pool fishes. When one fish persistently chases another, you can be reasonably sure a male is driving a female. If examined closely in Spring, the male will be seen to be long and trim with white dots like pin points on his gill plates; the female will be lopsided from carrying roe.

In the early morning hours the fish can be seen swimming through the floating plants, on which they will deposit their glass-like eggs. Fertile eggs are hardly visible in water; those which are infertile become white.

These eggs, attached to plants, should be lifted and placed in shallow pans of water to hatch. A place where from 75 to 78 deg. F. prevails will hatch the eggs in from five to seven days. Avoid boiling sun or the eggs may cook. When the youngsters hatch they resemble black threads; they feed on an eggsac for a few days, then hunt food. Bits of hard cooked egg, powdered fish food or powdered shrimp may be sprinkled on the water for them. When distinguishable (by shape) as fish they may be gently placed back in the pool and may escape their parents if sufficient plants have been provided. An alternative method, and probably the easiest, is to remove the parent fish from the pool after spawning and return them when the babies are large enough. Be sure snails are not on the plants with the eggs for snails dearly love the taste of goldfish caviar.

ENEMIES

Not many goldfish enemies are found in a garden pool. Snakes of the water varieties, snapping turtles, kingfishers and marsh hens should be guarded against. Dragon flies, *Diplax elisa*, and their larva, as well as the beetle, *Dytiscus harrisii*, and its larva, commonly called the water tiger, are capable of inflicting severe injury from biting.

Fish lice when found should be hand picked and killed. None of the enemies noted is so destructive to young fish as the fresh-water polyp, *Hydra viridissima*, which are frequently introduced on new plants. Fortunately, a few four horned snails, *Ampullaria gigas*, if added among the scavengers will eat the hydra in preference to other food offered.

WINTERING GOLDFISH

If you have purchased scaleless fish they should be removed from the pool in late Fall. Scaled varieties will Winter well under a blanket of ice in the pool at least 2 ft. deep. A hole should be cut in the ice to prevent the air supply being cut off from them entirely. An aquarium in the home is so attractive that many prefer to bring their fish in for the Winter, although this, as can be seen, is optional with the owner of goldfish in a garden pool.

Chapter XL

HOUSE PLANTS THAT ARE DIFFERENT

By SADIE HECHT

**Bromeliads — Philodendrons — Nephthytis — Dieffenbachia —
Vitis rhombifolia — Saintpaulia ionantha — Rosa rouletti —
Pachysandra — Succulents — Terrarium or Wardian Case Plants**

THE chance remark of a nurseryman at one of the Miami Beach flower shows, and a motor trip through Florida where I saw hundreds of air plants and other native plants—and then on my return to the North to meet with the everlasting Sansevieria, English Ivy, so-called Japanese gardens and Rubber plants—all this awakened a desire within me to experiment with plants that were different—that would take kindly to home and to office conditions.

Several years ago the "living-vase" plants were novelties seen only in conservatories and at exhibits. Explorations in the American tropics by members of botanic gardens have given us much data. Commercial nurserymen became interested, stocks were grown, new hybrids originated, and today these unique plants of the Pineapple family (or Bromeliads) are finding a place in the enterprising florist's shop and eventually in the home of the plant lover.

These plants are epiphytes of the American tropics, many of them native in Brazil. The wind blown seeds lodge readily on the branches and trunks of living and dead trees. In Florida it is not an uncommon sight to see plants of *Tillandsia usneoides*, the Spanish-moss, growing on telegraph wires and on fences. Some of the other Tillandsias or Wild-pines are equally at home on wire fences. Decayed leaves and air elements furnish food. Nitrogen is absorbed by the cells; there is probably a symbiotic fungus present as in the orchids. The thickened epidermal cells of the fleshy leaves prevent much transpiration of water, and small amounts of humus fall into the cup-shaped rosettes of leaves and hold the rain and moisture which condenses from the dew.

We can approximate these conditions in the home and find that the Bromeliads are most adaptable and give increasing pleasure.

In general, Southern grown or tropical or sub-tropical plants that are accustomed to semi-shade, wet and dry conditions, which have an all-year growing season and are practically evergreen in their native homes, are, I believe, the type of plants that can be adapted to our city conditions. Among this group are the Bromeliaceae (Bromeliads), Araceae, and the strikingly colored, moisture loving foliage plants that do need some extra care if we would enjoy their beauty. All require larger amounts of water during the season of active growth, little or no sun, and some will endure shadier situations than others.

BROMELIADS

In place of loam we pot the Bromeliads in fibrous material with crock and charcoal for drainage. The fiber admits air and retains moisture. A type of clay flower pot that is arranged to admit more air from below is also very good, or the drainage hole at the bottom may be enlarged. I immerse the entire pots in water at room temperature, weekly during the Winter months and twice a week during extremely hot weather, with a daily spraying of the leaves (except during very humid weather), using a fine mist-like spray. A clean atomizer is useful for small plants or for a few plants; both upper and under surfaces are easily sprayed. Only a few minutes immersion is necessary. Bromeliads require more frequent spraying of the leaves and less moisture about the roots. Avoid wetting blossoms of plants that are in flower, for the petals wilt rapidly. My plants are kept on enamelled gas range trays covered with three-quarter inch of pebbles, charcoal and sheet moss, which holds the excess moisture drained from the pots, allows of easy spraying and helps keep the surrounding air moist.

I have never found a diseased plant, although they may become infected with scale. Exposure to strong sunlight will cause burn, which appears as brown patches on the leaves, but these spots should not be confused with the natural markings of some varieties. Burn frequently occurs in the greenhouse when the plants have been close to unshaded glass.

Bromeliads have been potted and grown by me in city homes where ideal experimental conditions existed. Temperatures ranged from 96 deg. in Summer to from 42 to 75 deg. in Winter, and no special protection was given. (One day the temperature dropped to



Left, *Billbergia perringiana* and, right, *Aechmea legrelleana* which blossomed under electric light. *Aechmea fulgens* variety in center foreground

38 deg. when a window was blown out—without injury to the plants which were in an adjoining room.) The average temperature at the plant stands, 8 in. from the windows, was 62 deg. during the Winter. The exposure was northwestern, with one to four hours of afternoon sunlight during eight months of the year and no sun during the remaining four months; strong light slightly obstructed by *Ailanthus* trees during the Summer. In a living room enclosed by a wide roofed veranda, a bark arrangement of these plants is going into its second year of growth, with only two replacements. In a room with northern exposure and 20 ft. from the windows, an arrangement in a strawberry jar has made a splendid display for a year. Grown in offices under electric light, without direct ventilation, they have done marvelously well, even flowering at their normal time. A plant that will give so much pleasure for so little outlay and asks only for a little intelligent care is surely a most welcome addition to our homes.

Of the sub-groups of the Bromeliads which are obtainable, there are *Billbergias*, *Cryptanthus*, *Aechmeas*, *Tillandsias*, *Dyckias* and *Aregelias*.

BILLBERGIAS

The Billbergias have the most showy inflorescences of all the Bromeliads. The fleshy leaves are arranged in upright rosettes, have more or less spiny margins, and range in color from pale green to deep green, with rose and bronze shadings, white spotted, purplish near the base of the leaves, and many are scurfy on the undersides of the leaves. The inflorescence is a spike which bears brightly colored leaf bracts of orange, red or pink and in one variety they are variegated. This spike grows rapidly; on Dec. 2 the tips of the flowers of *Billbergia perringiana* (a hybrid) were just showing their rich purple color above the deep pink leaf bracts. On Dec. 7 the spike had grown to a length of 11 in., and two days later an additional 2 in. and the flowers are opening gradually. These plants are in an office separated from a court window by a glass topped partition and an electric light provides the only light all day. The small flowers of the Billbergias are in panicles or racemes, short-stemmed and most strikingly colored whites, blue-purples, violets, and reds in combination—with blue-violets predominating. Hybrid forms are frequently showier than the parents.

Propagation is by offsets which usually appear after the flowering period. When the offset or sucker is well grown, cut it from plant, remove two or three leaves at the base and let dry for a day or two. Plant in fibrous material. Some suggest rooting in sand. My experience in the home has been more satisfactory with the former method. Summer, the season of active growth, I have found to be the most satisfactory time. Of course, when one has bottom heat available, rooting can be done at almost any time.

There is little literature about these unusual plants, and insofar as it has been possible to do so, I have determined the accurate names of varieties by reference to available books, by checking living plants with botanical gardens, conservatory and herbarium specimens. Growers do not always call the same plant by the same name. There are numerous other varieties in addition to those mentioned here. I refer to those that are in the trade.

Billbergia pyramidalis and *thyrsoidea* types have non-rigid leaves, 1 to 2 in. broad, pale green and dark green, above and beneath. They have 20 to 40 flowers on a dense, erect spike, mauve-scarlet and violet-purple. The leaves curve outward.

Billbergia nutans has narrow green leaves tapering to a long point,

about 1/2 in. wide at the middle. There are a few flowers on the drooping scape, with bright red bracts and green petals edged with blue.

Billbergia liboniana is a rigid, fewer leaved type of bluish-green color. The leaf is 1 to 1 1/2 in. broad at the middle and tapers gradually to a point. The bracts are pale and less conspicuous, with few flowers of red, green and violet at the tip.

Billbergia leopoldi with bronzy-red and green leaves and transverse bands of white, *B. saundersi* with small white spots, and *B. sanderiana* with rose-green coloration on the underside of the leaves, are other varieties obtainable in addition to a host of hybrids.

CRYPTANTHUS

Cryptanthus are the dwarf varieties of Billbergias, the leaves usually appearing in flat rosettes. The three-petalled white flowers are in dense heads, nearly sessile—that is, they grow close to the stem—and last but a day or two. However, the large cluster of buds which appears in the axils of the leaves has given continuous bloom over a period of about two weeks. The meaning of Cryptanthus is “hidden flower.”

Cryptanthus acaulis has rather broad leaves and is plain sea-green in color. It is commonly seen.

Cryptanthus acaulis ruber is a reddish-leaved variety.

Cryptanthus rosea picta has longitudinal bands of bronzy-rose and green. The rosy color fades in the absence of all sunlight, but can be restored with exposure to mild sun.

Cryptanthus bromeliodes is somewhat upright growing with elongated leaves transversely barred with white. A variety not upright which has dark green elongated leaves with reddish tints is also called *C. bromeliodes*.

Cryptanthus zonatus is perhaps the most strikingly colored of all, with dark green leaves transversely banded with irregular markings of bronze and silvery white, very scurfy silver beneath.

Cryptanthus diversifolia (also called *C. terminalis*) has slender pointed leaves, deep green above and scurfy beneath; it grows tall and has a branched effect with its offsets.

Cryptanthus bivittatus is dull brown beneath and green above, with two narrow buff or reddish bands longitudinal on the leaf.



Photographed through courtesy Brooklyn Botanic Garden.

Philodendron cordatum trailed on bark, *Cryptanthus* varieties in bud and in blossom, and *Ficus repens*, the Climbing Fig

Cryptanthus beuckeri is a brownish-green or rosy on the face of the leaves, spotted with dark green.

Cryptanthus osyanus is dark olive-green with cream colored markings.

All of these varieties may be used in combinations and many striking arrangements are possible.

PHILODENDRONS—NEPHTHYTIS

More than 200 species of Araceae have been found in the American tropics. They are naturally tree climbers of the lower moist forests and are equally at home in a loose moist soil or in water. I have found them to be the most satisfactory of all foliage plants for the home. They will absolutely thrive in a sunless room if given a little care. Keep the soil moist and spray the leaves frequently, or daily if in a dry atmosphere. Backed with bark on which to attach their aerial roots, the Swiss Cheese plant, properly *Monstera deliciosa*, but known in the trade as *Philodendron pertusum*, and the *Philodendron dubia*, are most attractive. *Monstera deliciosa* is native to Mexico and Central America and is grown in the open in the South. The leaves are oddly cut and frequently one finds large holes, hence the name Swiss Cheese plant. The juvenile leaves are heart-shaped. The leaves of *Philodendron dubia* are deeply cut and rich dark green in color. It is a most decorative plant. Very few florists sell these two plants. Probably they are not familiar with their decorative possibilities. A *Monstera* that was carelessly left near a steam radiator at the office and apparently ruined was taken home. It remained dormant for about eight months. In June the stem was cut back to one leaf. In three months the plant developed four new leaves and three aerial roots. It was placed on the window sill where there was about two hours of morning sun—south-eastern exposure. For three months it has been 12 ft. from the window in a temperature of 65 to 75 deg. and has had plenty of light but very little sun. The leaves have enlarged somewhat. This plant was potted in fibrous material and during active growth was watered daily. In cold weather it is watered and sprayed two or three times a week.

Philodendron cordatum is what one would call a foolproof plant. The leaves are thick, dark green and heart-shaped, and as in all the aroids, the new leaf is enclosed in a brownish sheath. It also sends out aerial roots. It is a splendid plant for the wall pot or bracket and for plant stands; it may be trailed on bark or just allowed to droop.



Photographed through courtesy Brooklyn Botanic Garden

Dieffenbachia picta, Cryptanthus diversifolia and Monstera deliciosa, the Swiss cheese plant.

It is a vine that will thrive in dark places, sometimes actually resenting sunlight. It is quite resistant to insects and disease. In only one instance have I seen mealy bugs on them in a greenhouse. The Philodendron is the one plant that will grow and flourish where nothing else will grow.

Nephtytis liberica, a native of tropical West Africa, upright and spreading in habit, is of the same type. The stems are reddish colored and the leaves arrow shaped. A similar plant with green stems is called a Philodendron species. The leaves are arranged closely on the climbing stem and it will grow with little sun in either water or in a loose porous soil. It needs to be kept moist. Frequently a lower leaf will yellow or become spotted; reason unknown. Remove the leaf when it becomes unsightly and the new growth continues.

Pothos aurea, a vine often called Philodendron, has brighter green leaves and creamy-white markings. It has not been as satisfactory under my conditions. The longer trailing stems are most attractive used in flower arrangements.

The Aroids are propagated by division of the climbing stems and will root in sand or water. In the house I use my Forsythe pan to start cuttings. It is a miniature cutting bed and is prepared as follows:

DIRECTIONS FOR MAKING THE FORSYTHE PAN

Place 2 in. of a mixture of washed coarse building sand or clean bird gravel and soil in the bottom of a 5 in. pan. Tamp down firmly and evenly. Next plug the hole in the bottom of a 2 in. pot with putty or a cork. Place the pot on top of the sand and fill in around with moist sand, firming into place. Have the top of the sand flush with the top of the small flower pot. Make a hole with a small dibber and insert cuttings in the sand. The pot is kept filled with water which seeps through the porous sides and keeps the miniature cutting bed moist at all times. I have used this device for not only indoor plants, but also for rooting cuttings of shrubs. When the cutting is well rooted, pull it gently and if it resists, roots are formed. Remove from pan with a dibber and pot in a 2½ in. pot. Some cuttings where two or three joints are taken may require a larger pot. Soil mixtures depend upon the kind of plant we are growing. Some will need more humus, others more sand. Some like acid soil, some neutral and some alkaline. Numerous books are now available, so one can have happy plants if one would take the time to find out just what a particular plant's likes and dislikes are.

DIEFFENBACHIA

Dieffenbachias or Dumb-cane are native to Central South America where 12 species are found. The long leaves are variously splotted with white, green or yellow. These are useful because they will thrive in dark places. It is a good plan to place several plants in one pot with root balls just below the surface of the soil. When the lower leaves begin to drop, as sometimes happens, the plant will look less unsightly. If the plant grows tall and straggly, cut it back. The stem is cut into pieces 2 to 3 in. long and dried for a day or two and started in sand. Shoots grow and develop roots which are then potted in a fibrous soil.

VITIS RHOMBIFOLIA or GRAPE-IVY

Vitis rhombifolia (*rhomboidea*) or Grape-ivy is sometimes called *Cissus rhombifolia*. (Cissus from kissos or Ivy refers to the scrambling habit of the vitaceae.) It is a most fascinating and charming introduction from the West Indies and South America, where the leaves are evergreen. Thinner than most evergreens, the leaves are shiny green above and rusty hairy on the veins beneath. With its silvery leaf buds, which are most attractive as they unfold, and the graceful airy stems and curling tendrils reaching out into the nowhere, this is one of the most decorative of plants. It is a lovely subject for radio cabinet, console, table, stand or wall bracket. As one plant lover said, she much preferred its spreading drapery of green to a drapery of fabric! And mere man has succumbed to its charm!

Although a tender plant it has been grown in porch baskets outdoors during the Summer. If not taken indoors early in the Fall it has a tendency to drop its leaves. A pot plunged in the garden has also done well and was brought into the house early in September. Excessive moisture or dryness will cause the leaves to drop. It needs plenty of light and some plants have succeeded with a little sun and some have not. Young plants in 3 in. pots are making rapid growth under electric lights (80 watt lamps used in an office); in fact, they are better than the plants at home. The soil is thoroughly watered two or three times weekly when the surface is dry and powdery, and the foliage is sprayed daily. The clay pots are in flared copper flower pots. There is no direct daylight and the temperature averages 70 deg. during the day and 45 to 50 deg. at night. The Grape-

ivy is propagated by softwood cuttings made in the Spring. My Winter cuttings failed to form roots. It is quite resistant to insects, though I have occasionally noted a mealy bug or two on a greenhouse plant. It is wise to carefully examine every new plant which comes into the home and immerse the entire plant in a solution of Volck prepared according to directions on the package. Garden Volck combines nicotine with an oily spray material and combats both scale insects and aphids. If the plant cannot be immersed, then spray every part thoroughly, especially the stems and undersides of leaves, using a mist-like spray.

SAINTPAULIA IONANTHA

Saintpaulia ionantha, Usambara-violet or African-violet, is not a Violet, but one of the Gesneriaceae, related to the Gloxinias. It is a low growing perennial about 4 in. high. A recent revival, it is finding a place in the house, in the rock garden and as an edging in the border. It likes a moist, cool, shady place and does well in the house in a north or northwestern window. It is a good companion plant to the Begonias which require similar conditions for growth.

It is most important that the soil be kept moist at all times and not permitted to dry out when the plant is grown indoors. If the pot cannot be immersed, then apply water carefully near the edge of the pot. The crown of leaves will rot rapidly if allowed to accumulate moisture.

Propagation is effected by seeds, leaf cuttings, and divisions of clumps. Seeds started in January should bloom in July or August—out of doors in a frame. While Spring is the logical time for making divisions, I successfully divided a large clump of a flowering Saintpaulia without apparent check to either division. The clump was lifted from the greenhouse bench with a large ball and laid on moist soil but not potted until two days later. It was divided and potted in soil rich in humus, kept moist on a shelf beneath the plant stand for three days and then placed in subdued light 2 ft. from a court window, northwest exposure. Not a flower dropped and the plants grew on in the living room. Several weeks later the larger division was moved to a room with south-eastern exposure and a temperature averaging 70 deg.; petals dropped and the leaves began to droop. Returned to its former situation, the plant revived and new growth from the crown was made.

For continuous bloom remove the faded flowers and prevent seed from forming. Although I have not tried it in the rock garden, the experience of some persons is that protection is required in extreme weather.

ROSA ROULETTI

Rosa rouletti, the tiniest Rose in the world (5 centimeters high with a flower $1\frac{1}{2}$ centimeters in diameter) was found growing in a peasant's cottage in a small village in Switzerland by Henry Correvan of Geneva. It had been propagated by the peasants for generations as a window plant and had never been grown in gardens; it was "too delicate." Correvan took a plant back to Floraire and used it for propagating. A bed of cuttings planted outdoors grew to 10 centimeters in height, but the flowers and leaves remained small. They flowered perpetually beneath the snow. Surely not a very delicate plant!

It is most satisfactory in the sunny window and is being tried in dish gardens. It enjoys some peat moss mixed with the soil and is ideal in the rock garden.

PACHYSANDRA

Pachysandra needs no introduction to those who know it as a ground cover. A handful of cuttings, wrapped in sphagnum moss, and temporarily heeled-in in a 7 in. pot in April, promptly made splendid roots. They were left undisturbed outside the window until October, when they were brought inside and given north-western exposure. In December the stems arched gracefully and the leaves were well grown and richly dark green in color—a plant that brought favorable comment when exhibited. A chemical fertilizer had been given monthly, and the usual method of watering with weekly immersion and spraying was followed. Ordinary garden loam was used and the sphagnum was not removed, the roots penetrating through it.

During the past year new cuttings were again started, but indoors. No fertilizer was given and the situation was a less open one, with indirect light from the southwest. The plants are not as well developed as compared with the growth made at the same time in the preceding year. And the plant that was grown near heat is quite straggly. Pachysandra at its best, I would say, should be started and grown out of doors, and after it is brought into the house it

should be placed close to the window in a cooler situation. Ten or a dozen cuttings bunched together make for a well balanced pot plant.

SUCCULENTS

Although succulents are not unusual, brief mention might be made of a few varieties. Most of them are not entirely hardy in the temperate zone and can be used out of doors during the Summer; some make splendid house plants, their strap-shaped leaves in close rosettes proving interesting. Some that I tried did not fare so well after October.

Gasterias, Aloes and Haworthias, mostly natives of South Africa, though appearing elsewhere also, are members of the Liliaceae. They rarely flower in the home, but they may flower in the conservatory. Propagation is effected by suckers which are cut from the parent plant with a sharp knife and allowed to dry in the sun for two or three days; or the cut surface may be dusted with powdered charcoal. Small sized pots should be used and placed in a sand bed. Little moisture is necessary until the plants are rooted. A good potting mixture is made of three parts loam, one part rotted manure, and one part broken rubble. Provide plenty of coarse drainage (one-third or one-fourth of a potful is not too much) and pot the plants firmly in the required soil mixture. (Fibrous rooted succulents need a richer soil mixture than do the fleshy rooted ones, because the former have a larger feeding area.)

The Figmarigolds or Mesembryanthemums, also called Midday-flowers because the flowers open only while the sun shines, are interesting because of the peculiar shapes of the leaves and the methods of branching. Low growing succulents allied to the cacti, they differ in that they are spineless and bear true leaves. Most species are native in the dry, rocky, barren places and the dry sandy plains of South Africa. *Mesembryanthemum crystallinum*, a common house and garden plant, is one of two that are found in California. I have seen them growing in the sand and rocky cliffs of Southern California within a stone's throw of the ocean. *M. edule* is frequently used at the seaside to hold sand and to provide a ground cover. The flowers are mostly in reds, whites and yellows. When the plants are placed out of doors in the Summer they should be elevated and given plenty of sun.

Crassula lactea is of value because of its pretty white Hyacinth-like flower, about 3 in. high, which we enjoy in December. The

flower lasts for two or three weeks. The Kalanchoes with dense heads of tiny, four-petaled flowers of bright red, orange or yellow also give color for several weeks. These plants may go into the rock garden in the Spring.

Euphorbia lactea, reminiscent of the cactus, has branching arms, sometimes regular and sometimes in grotesque formation. It has been called Coathanger or Lamppost.

TERRARIUM or GLASS CASE PLANTS

We have usually associated the terrarium with living plants of the woods. Today there is a growing tendency to grow all sorts of plants under glass, especially in the home, where conditions are not always favorable. Planted directly in soil in such a case and watered, plants may go for five or six months without additional watering in a large case. If the plants are kept in pots, watering will be required oftener. Some ventilation is needed. Frequently plants grow rapidly under these conditions and become too large. They then need to be replaced with smaller ones. If mold appears, give more ventilation.

Limit the plants to those that require moist conditions: The Crotons, which one usually finds in made-up hampers at Christmas time and which live only for a few weeks after their arrival, gorgeous in color and most attractive; Marantas, with white pencilled lines of the leaves, dark green above and red beneath; *Ficus repens* and its variety, variegata, the Climbing Fig, allied to the Rubber plant, which we see climbing on conservatory walls, the tiny overlapping leaves presenting a flattened effect; *Dracaena sanderiana*, with creamy yellow stripes extending longitudinally on the leaves, and *D. godseffiana* or Gold-dust Dracaena; Fittonias with red and white venation on the heartshaped leaves, a plant that comes to us from Peru. To get the best effect in the case, the Fittonia is propagated by cutting the points of the shoots, with two small leaves and one joint, and rooting them in the sand. The older plant is very scraggly. Peperomias also need to be replaced when they grow large. *P. pericati* has done well in a northwest window when kept rather moist. The *Selaginellas* are excellent, as is Helxine or Corsican Carpet Plant. Ceropegia or String-of-hearts, one of the Asclepidaceae, has small heart-shaped, dark green, fleshy leaves with indistinct white venation above and the stems and under surface of the leaves almost a beet red. Bulbils form on the vine and it is pro-

pagated by cuttings inserted in sand. In the absence of sunlight the leaves and stems are pale green in color; that is, during the Winter. A recent introduction is the five-gallon demijohn. Drainage and the needed soil mixture are placed in the bottle and the plants manipulated into place with various long-handled devices. A toasting fork has been used by some, or a long stick. The small plants grow on and to the unknowing are a puzzle. One with Poinsettias, Crotons, Fittonias and low growing plants was a picture worthy of an artist.

GENERAL DIRECTIONS

All plants need air, various amounts of light and moisture. Roots need aeration, and when we soak plants for hours or permit water to remain in a jardinière or saucer, we soon have a waterlogged condition of the soil. No air can enter, the soil sours and the plant will eventually die from oxygen starvation. The stem and leaves look green and healthy, and usually the plant collapses rather suddenly. If you cut the stem at the soil surface, you will find the stem rotted. More plants are probably killed by overwatering than by under-watering.

Avoid opening windows directly in front of plants in cold weather. The temperature may have been 70 deg. The window is opened and a blast of 20 deg. lower temperature sweeps in. And we wonder why the plants wilt! Plants are as susceptible to chill as are people. Remove the plants to another room or protect them from chill air with newspapers.

Water regularly and spray frequently. Small amounts of water at irregular intervals are worse than none at all. The water fails to penetrate and the fine feeding roots low in the pot are not in contact with the dissolved food nutrients. The root hairs can only absorb food which is in solution; consequently the plant starves from lack of food and water, and the leaves yellow and drop. Midafternoon is a good time to practice watering; the plants will have dried and are not subjected to chill in the cooler night temperature. I give my own house plants a weekly immersion in the bathtub (twice weekly in very hot weather) and spray two or three times a week, or oftener. At the office the plants are sprayed daily and sometimes twice a day, because there is less ventilation and more heat.

Drainage is most essential. Broken crock, pebbles, stones, coal ashes, pieces of charcoal, and coarse material that allows a free

passage of excess moisture may be used. If you must use a glazed container without a drainage hole, put at least an inch of drainage at the bottom and a layer of Spaghnum before adding soil mixtures. The only justification I see for glazed ware is in a hanging arrangement that is subjected to excessive evaporation—and then it should have a drainage hole. The porous pot dries out more rapidly.

Overpotting is another error. Repot when the roots have completely filled the outside of the ball of earth. Use a pot the next size larger, not one several inches larger. By confining the roots top growth is made. Too large a space encourages root growth and retards top growth. Too much soil is wasted soil; the plant can only assimilate as much food as it needs.

Feed plants when they are making active growth about every two or three weeks, depending on the vigor of the plant. The more vigorous and active, the greater amounts of food and water needed. Plants are in the resting stage during December and January and cannot utilize stimulants or foods then. Many good fertilizers are now on the market in small packages, including a dehydrated cow manure. (Incidentally, stop the use of manure water when your buds show color. Its continued use causes the flowers to lose some of their brilliancy of coloring.) Water your plants two or three hours before an application of chemical fertilizer is made to avoid burning. Follow carefully the directions given on the package, as the nitrogen, phosphorus and potash contents vary.

Learn the conditions under which the plants grow in the land of their origin and approximate these conditions if you can, and then, with eternal vigilance and daily care, enjoy the happy plants of your indoor gardens.

The writer expresses her appreciation to Dr. John K. Small, who made helpful suggestions, and to Dr. C. Stuart Gager for permission to photograph plants. Also to W. H. Becker, Montague Free, L. J. Smith and to T. H. Everett, who assisted in the identification of the Bromeliads.

*For a complete work on the subject of general house plants,
we recommend*

MILADY'S HOUSE PLANTS, by F. E. PALMER

*For a complete work on the subject of terrariums,
we recommend*

GARDENS IN GLASS, by MILDRED NORTON ANDREWS

Secure these books where you bought your Garden Guide.

APPENDIX

CALENDAR OF GARDEN OPERATIONS

Northern and Middle States

By ALFRED C. HOTTES

JANUARY

This is a good month to get out the old garden magazines and read them.

Remember that a planned garden grows in your affection, whereas a hodge-podge is a disappointment.

Plan good color combinations.

Bring such potted bulbs to the window as have produced good root systems.

Spray trees and shrubs with lime and sulphur if they are infested with scale.

Use the Christmas trees for bird feeding stations or cut off the branches to use for mulching perennial beds.

Stake the evergreens that are being bent over by the ice and snow.

Send for seed and nursery catalogs.

Place the Christmas Poinsettias in the basement when the leaves become unsightly. For further care see May.

Garden tools should have the handles painted a bright color so that they can be easily found. The blades should be filed sharp and painted with oil to prevent rusting.

Remove the dead wood, and slightly open up the center of the fruit trees.

Place newspapers over the house plants on the coldest nights to prevent cold draughts.

FEBRUARY

Read also December and January.

Organize a garden club in your community.

Order seeds. Try some new things each year.

Paint your garden furniture.

Cut branches of shrubs for growing in water.

Put out suet for the birds.

Prune Grapes. See page 376.

Repot some of the house plants such as palms and ferns. They will soon start new growth as the days become longer.

Late in the month seeds of perennials may be sown in a sunny window.

Give the house plants a good scrubbing with water once in a while to remove dust.

Prune back the Peegee and Snowhill Hydrangeas so that each branch is a mere stub.

MARCH

Do not uncover the perennials and bulbs. Allow the mulch to remain, add to it, but loosen it so that it does not form a heavy mat.

Sow seeds of Lobelia and Verbena in a sunny window. Both these annuals require a long growing season. Seeds of Moonvines may also be sown in individual pots.

Prepare the hotbed and coldframe. Investigate the value and uses of an electric hotbed.

This is the month to graft fruit trees.

Prune Hydrangeas and Anthony Waterer Spireas very severely. Cut the plants back to mere stubs.

Divide old clumps of Hardy Sunflowers, Phlox, Sedums and all rampant perennials.

Each year the hardy Chrysanthemums need a new spot for growth. Divide the clumps into small pieces and set out the divisions about 3 ft. apart.

Give the Asparagus bed a liberal feeding with nitrate of soda.

As soon as the trash is cleared away from Peony, Phlox, Delphinium and many other perennials, spray the soil with bordeaux mixture. This will help prevent diseases at a later time.

Place a box or small keg over Rhubarb to cause it to produce tender, long-leaf stalks.

Transplant all such young trees, old shrubs, evergreens and perennials as need to be moved.

Heel-in your new nursery stock as soon as it arrives. It should not be planted hurriedly, but carefully, and for that reason merely keep the roots covered with soil until you have leisure to do the work properly.

Spray all scale infested trees and shrubs with a miscible oil before the leaves start.

Sow seed indoors, using equal parts of peat moss, soil and sand.

Give all the beds and lawn a liberal feeding with a complete high-test plant food.

Before growth starts, trim off the erring shoots of the evergreens. Shear off the tips to make the Junipers, Retinosporas and Arborvitae more compact.

Plant Roses. Let them start growth while the weather is cool.

As early as possible sow Sweet Peas.

Glance at the rock plants to see if they have heaved from the soil; in which case, plant them at the proper depth.

Spring is not the ideal time to seed lawns (See September), but there are generally a few bare spots that need to be seeded.

Make the first sowing of Peas, Lettuce, Radishes and Spinach as soon as the soil can be worked.

Burn the tops of the Iris to destroy the borer.

Remember that there are three kinds of annuals: The hardiest annuals may be sown now in the open soil, the tender annuals must not be sown until all danger of frost is passed, and the annuals which require a long growing season should be sown indoors to give them an earlier start.

APRIL

Spray Currants and Gooseberries with arsenate of lead to control the worms.

Sow seeds of ornamental grasses.

Prune hedges before growth starts.

Set out Pansies.

Plant Potatoes, soaking them in formaldehyde solution, or dust with formaldehyde dust to prevent scab.

Remove the water sprouts which arise as the result of pruning fruit trees.

Plant first lot of Gladiolus and continue to set more every 10 to 14 days for a succession of bloom.

Gradually uncover the perennials.

Sow Celery seed in a coldframe.

Be sure to accustom the tender plants growing in the house or coldframe to the cold before setting it in the garden.

Start protecting the Roses against disease by dusting regularly with Massey's dust or spray with some solution recommended by your dealer in insecticides and fungicides.

Sow hardy annual flowers and vegetables. Among these are Four-o'clocks, Sweet Alyssum, Cornflower, Calendula, Radishes, Lettuce, Peas, Beets, Carrots and Onions.

Roll the lawn with a heavy roller to keep the surface even.

Feed the lawn with a complete high-test plant food so that the sod will grow vigorously before the approach of hot, dry weather.

Plant trees, shrubs and perennials. All such trees as Beeches, Magnolias, Flowering Dogwoods, Ornamental Crabs, Cherries, Tuliptree, Sweetgum and Japanese Maples transplant best in Spring.

Sow the seeds of the various herbs.

MAY

Do not remove the leaves from the bulbs which have bloomed until the leaves have turned yellow.

Control the weeds; don't put it off. Give the Dandelions a dose of gasoline, using a bottle with a perforated cork or one of the gadgets especially designed for the purpose.

Plant Cannas and Dahlias.

Cut the lawn regularly. Young grass should not be cut too short.

Feed the perennial beds and lawns with a complete high-test plant food.

Place the house plants among the shrubs where they may recuperate their strength.

Give the Peonies an abundance of water while the buds are swelling.

Sow Beans, Corn, Squash and other tender vegetables when danger of frost is passed.

Protect Roses against attacks of insects and diseases. This is most important.

Continue to plant Gladiolus for succession of bloom.

Use kerosene or gasoline to kill the weeds in walks, drives or between the stones of a paved area.

Sow all annuals by middle or end of month.

Prevent mildew and other diseases by spraying the young growth of perennials.

Such perennials as Plumbago and Platycodon are slow starting. Do not cut into the clumps when cultivating.

Prune Goldenbells and Garland Spireas soon after they finish blooming.

Bring up the Poinsettias from the basement and encourage them to grow.

JUNE

Remove the fading flowers of all annuals and perennials to prolong their period of bloom.

Cut off the old flowers of Rhododendrons and Lilacs to prevent seed production.

Watch for suckers on Lilacs, Roses and any grafted tree or shrub.

Remove about one-half of the developing Apples and Plums.

Spray Rhododendron Lacewings with nicotine extract, being sure to touch the underside of the leaves.

Place cuttings of rock plants in boxes of sand so that they will root.

Keep newly set evergreens well watered and spray the foliage daily.

Heavy new canes of Climbing Roses will need to be tied in place; otherwise the plants will present a shabby appearance.

Stake up Delphiniums, Boltonias, Hollyhocks, hardy Sunflowers and other tall perennials before they fall over.

Take care that Snapdragon plants are not watered at night; this spreads rust. To prevent rust, spray with bordeaux mixture.

Get your doctor kit ready—to spray the bugs and prevent diseases.

Set out the Waterlilies now, especially the hardy ones. The tender sorts prefer warm water.

Tobacco dust will control root lice on China-asters if it is dug into the soil.

Control the vines (let each one spread where you want it) by tying them in place and by pruning off excess branches.

As soon as borers are discovered in the stems of your plants try to reach them with a flexible wire or inject carbon bisulphide with a medicine-dropper.

Make a second sowing of the early vegetables.

Tomatoes trained to stakes give superior fruit. Train them from the start.

Have you ever transplanted Beets? Do so, setting them 6 in. apart so that they may develop.

The weeds are the mothers of thousands. Cut and pull weeds at every opportunity.

Plant Dahlias, Caladiums, Cannas, Tigridias and other Summer flowering bulbs.

Many seedlings are still very tiny and shallow rooted. Water them regularly and thoroughly, else all the early care will have been in vain.

Sow seeds of perennials in plant boxes or a coldframe.

Pinch back Chrysanthemum plants to make them bushy.

Apply plant food to everything that was not fed last month.

Plant out all tender annuals and bedding plants and fill the window boxes. Plant Tomatoes and other tender vegetables.

JULY

A mulch of peat moss will keep Roses as moist as they should be.

Water a Bluegrass lawn thoroughly

every day during drought or else it will become dry and brown. Do not change your policy by sprinkling only at week-ends.

Dust evergreens with dusting sulphur or spray with a miscible oil to control red spider.

Bare spots in the vegetable garden may be sown with Buckwheat to use as a cover crop.

Evergreens can be moved with ball-and-burlap. Spray the tops daily after transplanting.

Dig up and transplant Oriental Poppies. The roots left in the soil will serve as root cuttings and carry over the plants. Other roots may be cut into 3 in. pieces.

Nasturtiums bloom best when some foliage is removed.

Cut back Pansies, Sweet Alyssum and many of the straggling rock plants to induce new and bushy growth.

Sow seeds of Foxgloves and Canterbury-bells.

Prune the shrubs as soon as they have finished flowering.

Remove the canes of Raspberries after they have fruited.

When watering do a thorough soaking job or wait until you have the leisure to do so.

Japanese Iris enjoys plenty of water.

Tomatoes, Cucumbers and Potatoes need a spraying with bordeaux mixture to prevent blight.

Set out Strawberries.

Keep the weeds from the Asparagus bed by spreading a thick coating of salt over it.

Control weeds and cultivate; this summarizes the important work for the month.

Pinch back tips of Chrysanthemum shoots.

Allow one shoot only to the Dahlia plant.

Divide Iris.

Of course, you do not have any shallow spot in the pool where mosquitoes breed.

Trim hedges.

AUGUST

Set out late Celery.

Give Roses a good feeding of a well balanced plant food to prepare for the Fall crop of bloom.

Crab Grass must be prevented from going to seed. Rake it several ways and cut it low.

Sow fresh Delphinium seeds. They germinate better.

Dust evergreens with arsenate of lead to control bagworm.

The work this month is much the same as for July.

Remove the fading flowers of Phlox to prevent seeding, which generally results in magenta seedlings.

Pyrethrum extract sprays control black blister beetles on China-asters.

Madonna Lilies are resting this month and should be transplanted so as to be established ready for the Fall growth to start.

Sow the seed of Hollyhocks, Forget-me-nots, Pansies, Bellis and Violas.

Dust Phlox with dusting sulphur to prevent mildew and red spider.

Prevent seeding of weeds in the lawn by mowing, even if the grass does not need cutting.

Give plenty of water to Chrysanthemums.

Transplant perennial seeds sown in June.

Tie up the Dahlias so that they will be attractive when they bloom.

Spray weeds with arsenate of lead to control the grasshoppers.

SEPTEMBER

Stop the cultivation of Roses and let them rest so as to become thoroughly hardy.

Sow grass seed. Dig the area thoroughly and incorporate some plant food. Don't just sow seed on a hard surface.

Transplant Peonies.

Plant Rhubarb and Asparagus.

Cabbage heads crack because growth is encouraged too late in the season. Give each head a turn so as to break some of the roots.

Replant the perennial border. Divide plants. Add some well decayed manure or peat moss.

If you intend to lay pipes for watering the garden, do it now when the damage will not show.

Water the evergreens.

Ferns may be transplanted.

Gather the plants together which you will take indoors. Pot them carefully. Don't just shove them into pots. Remember they will have to remain in them all Winter. Bring a table to the garden for the purpose if you dislike stooping.

Disbud the Dahlias for large flowers.

Don't transplant Chrysanthemums, Japanese Anemones or other Fall flowering perennials. Wait until Spring.

Tie up Chrysanthemums so they will appear neat and orderly when they bloom.

Plant the Dutch bulbs, especially Crocus, Narcissus and Hyacinths.

Sow hardy annuals such as Cornflowers, Poppies, Larkspurs and others which often self-sow naturally in your garden.

Transplant the Pansies, English Daisies and Forget-me-nots sown last month.

Bank Celery with earth.

Just before frost, hang the Tomato vines upside down in the garage.

Place all disease-free refuse in the compost pile.

Treat the Dandelions with gasoline so that the lawn is as clean as possible for Spring.

Transplant evergreens, especially Pines, Firs, Spruces and Hemlocks. Some of the Arborvitae and Junipers are less safely transplanted after the fifteenth.

OCTOBER

Dig Carrots, Turnips and Beets, but allow the Parsnips to remain in the soil until Spring.

This is a good time to replant your home grounds, changing walks and beds.

Trees transplanted in Fall will get a hold and start right in to grow in Spring.

Water evergreens.

If Lilies are obtainable, plant them.

Mulch Lilies with leaves.

After a freeze, hill the Roses with soil to a depth of 1 ft. or more.

Turn off the water in any exposed pipes that may freeze.

In transferring the Foxgloves and

Canterbury-bells to the frames for Winter cut back the leaves. This helps in making them hardy.

Cover Rhubarb clumps with manure for Winter.

Cut off Peony tops and burn if they are diseased.

Prepare Rose bed.

Plant evergreens (See September).

Sow hardy annuals, Poppies, Larkspur and Calendula.

Topdress lawns with soil and bone-meal. Sow a little seed.

Plant bulbs but don't mulch them until after the soil is thoroughly frozen.

Pot bulbs for Winter bloom.

Dig Gladiolus and Dahlias.

Pot up some Parsley and grow it in the kitchen window.

Dig up the Chrysanthemums in bud. Divide perennials which seem exhausted.

Pile leaves.

Dig up the tenderer perennials and place them in a coldframe.

NOVEMBER

Plant Lilies. They always arrive late in the year.

The lawn will be improved by a thin coating of peat moss which will prevent Winter injury.

Burn the tops of the Asparagus.

If you have not protected your plants as yet, there is still time. Use some material that will allow the air to enter.

Sweet Peas should be sown late so that they do not start growth above the soil. So planted, Sweet Peas bloom early during the cool weather.

There is still time to transplant many shrubs and trees. Consult your nurseryman about this. Don't transplant the thin-barked trees.

Plant bulbs immediately. Give them an opportunity to produce their roots while the soil is warm.

Poinsettias indoors should be kept from draughts or else the leaves will fall before the flowers open.

Mulch bulbs after a hard freeze.

Spray for scale, using soluble oil or lime and sulphur.

Mealy bugs which attack house plants can be controlled by touching with a brush dipped in alcohol.

Small evergreens, or even branches, may be placed in a window box to add a touch of greenery as we peer through the windows.

Phosphorus and potash applied to the soil does not leach from the soil and becomes slowly available so that it is wise to apply in the Fall.

DECEMBER

Clean garden tools with emery paper. File the edges and paint with oil.

Remove the heavy snow from the evergreens. It might be wise to stake those evergreens which are constantly being bent and are thus becoming crooked.

Read garden books and know more than personal experience alone can teach. We all need a greater knowledge of pests, soils, combination and varieties.

Prune fruit trees.

Paint pruning wounds with shellac or with one of the products sold for that purpose.

Train English Ivy over the window.

Start Chinese Sacred-lilies and Paper-white Narcissus in pebbles and water or in peat moss.

Put out suet for the birds. Did you save your Melon seeds last Summer for the birds?

Use a wire netting or tar paper around the trunks of fruit trees to prevent rabbit and mouse injury.

Vines are easily removed from the house.

Start Sweet Potato vines in water. Be sure to get a Potato which has not been kiln dried.

Lily-of-the-valley pips may be purchased from florists. They are easily grown in sand or soil.

Observe the shrubs with berries and ornamental twigs. Order a few for next Spring's planting.

The South

By W. ELBRIDGE FREEBORN

CENTRAL SOUTH

The Central South includes a narrow 50 mile strip along the Atlantic coast between Cape Henry and Charleston. Roughly, the northern boundary would pass through Norfolk, Wilmington, Charlotte; north of Augusta, Atlanta, Birmingham, Meridian, Vicksburg, Memphis, Little Rock, Fort Smith, Muscogee; south of Amarillo, west of Abilene, north of Del Rio and through El Paso. The southern boundary includes a 50 mile strip of coast lying between Charleston and Jacksonville, passing from Jacksonville along the southern Georgia boundary north of Mobile, north of New Orleans, through Houston, Taylor and Del Rio. This section is often referred to more or less correctly as the Piedmont section of the South.

UPPER SOUTH

That portion of the South lying north of the upper boundary of what we have called the Central South, but south of a line drawn

through Washington, Louisville and Cairo (with the exception of that mountainous area in West Virginia, western Virginia, western North Carolina, the northern corner of Georgia, eastern Tennessee and eastern Kentucky) has a planting season about two to three weeks later in the Spring and earlier in the Fall. In most of this area Winter planting can be carried on as it is in the Central South.

There can be noticed considerable difference in the kind of plants grown—the addition of such vegetables as Rhubarb and such evergreens as Koster Blue Spruce.

EXCEPTION

The mountainous area before mentioned as an exception to this general area comprising the Upper South has a planting season and general practice similar to that of Ohio.

JANUARY

FLOWER SEEDS: Sweet Peas and hardy annuals such as Snapdragons, Arctotis, Calendula, Coreopsis, Candytuft, Clarkia, Cornflowers, Cynoglossum, Strawflowers, Larkspur, California Poppies, Shirley Poppies, Carnation-flowered Poppies, Stocks.

FLOWERING PLANTS: Perennial plants and Pansies may be transplanted.

BULBS: Japanese Lilies. Dead line for Spring flowering bulbs, such as Daffodils, Tulips, Hyacinths, etc.

SHRUBS: All kinds of flowering shrubs, conifers, broadleaf evergreens and shade trees.

ROSES: Plant now.

LAWNS: Plant Rye grass. In Southern section plant Kentucky Bluegrass, Meadow Fescue, evergreen mixtures, etc.

VEGETABLE SEEDS: Smooth English Peas, Mustard, Turnip, Rape, Carrots, Beets, Kale, Aragon Spinach, Kohlrabi and Radish as soon as the ground is dry enough to work. *Coldframe:* Lettuce, Cabbage and Onion Seed.

VEGETABLE ROOTS AND TUBERS: Asparagus, Horseradish, Artichokes and Irish Potatoes. Bed Sweet Potatoes. Take a chance on Onion sets.

VEGETABLE PLANTS: Cabbage. Take a chance on Bermuda Onions.

FRUITS AND BERRIES: All fruits, such as Peaches, Apples, etc., may be planted, as also berries.

FEBRUARY

FLOWER SEEDS: Dead line for Sweet Peas. Hardy annuals such as Snapdragons, Arctotis, Calendula, Coreopsis, Candytuft, Clarkia, Cornflowers, Cynoglossum, Strawflowers, Larkspur, California Poppies, Shirley Poppies, Carnation-flowered Poppies, Stocks, etc. *Coldframe:* Tender annuals, Zinnias, Marigolds, Petunias, etc.

FLOWERING PLANTS: Transplant all perennial plants and Pansies.

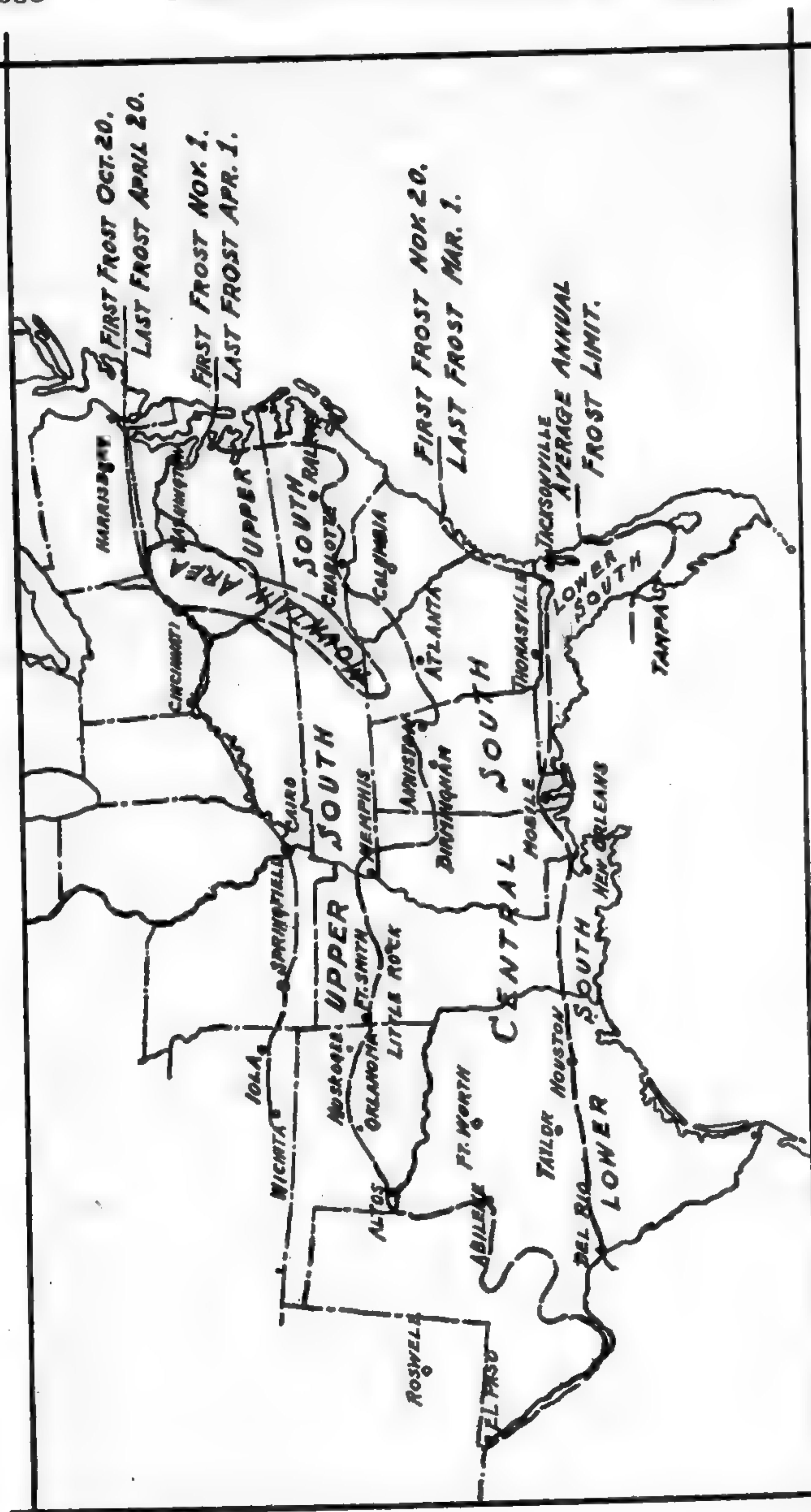
BULBS: Dead line on Japanese Lilies.

SHRUBS: Flowering shrubs, conifers, broadleaf evergreens and shade trees.

ROSES: All types of Roses may be planted.

LAWNS: Best Spring month for planting Kentucky Bluegrass, Poa trivialis, Redtop and evergreen mixtures, etc. for permanent lawns; Rye grass for the early Spring lawn.

VEGETABLE SEEDS: All of the vegetable seeds planted in January may still be planted and, in addition, wrinkled English Peas, Cabbage, Collards, Cress, Onions, Petsai, Salsify, Swiss Chard, Rutabagas. Take a chance on Corn. *Coldframe:* Cabbage, Tomatoes, Pepper,



Map of the Upper, Central and Lower South, showing frost dates according to information obtained from the United States Weather Bureau

The lower limit of the Lower South represents the average annual frost limit. The lower limit of the Central South represents the average last frost in the Spring about March 1 and the first frost in the Fall about November 20. The lower limit of the Upper South represents last frost about April 20 and first frost about October 20. These government records further indicated that frost dates, extreme low temperatures and annual rainfall vary more extremely in the Southeast than in any other section of the United States. These facts must be borne in mind in the reading of the accompanying Calendar of Garden Operations.

Eggplant, Onions, Cauliflower, Brussels Sprouts, Parsley.

VEGETABLE ROOTS AND TUBERS: Onion sets, Potatoes, Horseradish, Asparagus, Artichokes; bed Sweet Potatoes.

VEGETABLE PLANTS: Bermuda Onions, Cabbage and Lettuce.

FRUITS AND BERRIES: All fruits and berries, including Blackberries, Dewberries, Loganberries. Dead line for Strawberries.

MARCH

FLOWER SEEDS: Hardy annuals out of doors, such as Snapdragons, Arctotis, Calendula, Coreopsis, Candytuft, Clarkia, Cornflower, Cynoglossum, Strawflowers, Larkspur, California Poppies, Shirley Poppies, Carnation-flowered Poppies, Stocks. *Coldframe:* Tender annuals such as Zinnias, Petunias, Ageratum, etc.

FLOWERING PLANTS: Transplant perennials and biennials.

BULBS: For early flowers take a chance on Gladiolus, Cannas and Tuberose.

SHRUBS: Last month for planting shade trees, flowering shrubs, conifers and broadleaf evergreens.

ROSES: Last month for planting two-year-old outdoor grown Roses. First month for planting pot grown Roses and one-year rooted Roses.

VEGETABLE SEEDS: Continue to plant hardy vegetables such as were planted in January and February until danger of frost has passed; then tender vegetables may be planted. Take a chance on Parsley, Parsnips and Corn. *Coldframe:* Eggplant, Pepper and Tomatoes.

VEGETABLE ROOTS AND TUBERS: Horseradish, Asparagus, Irish Potatoes, Artichokes and Onion sets.

VEGETABLE PLANTS: Bermuda Onions, Cabbage, Lettuce and Brussel Sprouts.

FRUITS AND BERRIES: Dead line for fruits and berries during March; should be planted before last frost.

LAWNS: Plant Kentucky Bluegrass, Rye Grass, Poa trivialis, Redtop and evergreen mixtures for the permanent lawn.

APRIL

FLOWER SEEDS: All tender annual flower seeds may be planted out of doors, such as Ageratum, Alyssum, Asters, Calendula, Coreopsis, Cornflower, Cosmos, Crotalaria, Lantana, Marigold, Nasturtium, Petunia, Phlox, Portulaca, Salpiglossis, Salvia, Torenia, Zinnia, etc.

FLOWERING PLANTS: Transplant from the coldframe and greenhouse to the garden and flower boxes all tender flowers, such as Coleus, Geraniums, Petunias, Achyranthes, Wandering-jew, Fuchsias, Trailing Vinca, Begonias, Salvias, Dracaena, etc.

BULBS: Gladiolus, Cannas, Tuberose, Ismenes. Take a chance on Elephants-ears and fancy leaved Caladiums.

LAWNS: Evergreen mixtures, Kentucky Bluegrass, Redtop and Poa trivialis. Take a chance on Bermuda Grass.

WATER GARDENS: Plant hardy Water-lilies, Cabomba, Myriophyllum, Water-lettuce, Waterpoppies, etc. Take a chance on tender tropical Waterlilies and Water-hyacinths.

VEGETABLE SEEDS: The statement that all vegetable seeds may be planted in April is true for practical purposes. The hardy vegetables of February and March may be planted and, in addition, Cucumbers, Cantaloupes, Peanuts, Eggplant, Squash, Beans, Butter Beans and Water-melons.

VEGETABLE PLANTS: Tomato, Pepper, Sweet Potato, Cabbage, Onion, Eggplant and Parsley.

MAY

FLOWER SEEDS: All tender annuals may be planted in May. Ageratum, Alyssum, Asters, Calendula, Coreopsis, Cornflower, Cosmos, Crotalaria, Lantana, Marigold, Nasturtium, Petunia, Phlox, Portulaca, Salpiglossis, Salvia, Torenia, Zinnias, etc.

FLOWERING PLANTS: All annual plants and tender perennial plants may be transplanted to the garden or flower boxes: Coleus, Geraniums, Petunias, Achyranthes, Wandering-jew, Fuchsia, Trailing Vinca, Begonias, Salvias and Dracaena.

BULBS: Dahlias, fancy leaved Caladium, Elephants-ears or Caladiums, Cannas and Tuberose may be planted. Continue successive plantings of Gladiolus.

LAWNS: Plant Bermuda Grass, preferably hulled. Patch lawns planted earlier to Kentucky Bluegrass, evergreen mixtures, etc.

WATER GARDENS: Tender and hardy Waterlilies, Water-hyacinths, Lotus, Cambomba, Myriophyllum, Waterpoppies, Waterlettuce, etc.

VEGETABLE SEEDS: Successive plantings of vegetables planted earlier may be made. Plant Gherkins, Gourds, New Zealand Spinach, Butter Beans, String Beans and Cow Peas.

VEGETABLE PLANTS: Continue planting Tomatoes, Peppers, Eggplant, Cabbage and Sweet Potatoes. *Coldframe:* Plant Cauliflower, Brussels Sprouts and Celery for Fall crop in northern part of this section.

JUNE

FLOWER SEEDS: Continue to plant annual flower seeds.

BULBS: Plant German Iris. Dead line for Gladiolus, Cannas, Dahlias and Caladiums.

LAWNS: Plant Bermuda Grass, preferably hulled.

WATER GARDENS: Continue as in May.

VEGETABLE SEEDS: Cow Peas, Gourds, Gherkins, Pumpkins and Squash. Plant Cantaloupes and Watermelons. *Coldframe:* Cauliflower, Brussels Sprouts, Celery for Fall crop.

VEGETABLE PLANTS: Dead line for Sweet Potatoes, Collards, Tomatoes, Peppers and Eggplant.

JULY

FLOWER SEEDS: Annuals that flower quickly, such as Zinnias, Marigolds, Petunias, Ageratum, etc. *Coldframe:* Pansies.

LAWNS: Hulled Bermuda Grass.

VEGETABLE SEEDS: Rutabagas, Squash, Beans (both Butter and String), New Zealand Spinach, Blackeye, Lady and Cow Peas. Turnips the latter part of the

month. Collards, Cabbage in the cold-frame or in the garden.

VEGETABLE TUBERS: Irish Potatoes.

VEGETABLE PLANTS: Dead line for Tomatoes, Peppers, Eggplant, Cauliflower, Celery, Brussels Sprouts for Fall crop. Collards.

AUGUST

FLOWER SEEDS: Plant perennials, preferably in coldframe. Anchusa, Aquilegia, Candytuft, Canterbury-bell, Coreopsis, Clove Pinks, Daisies, Foxglove, Gailardia, Gypsophila, Hollyhocks, Regal Lily, Lupine, Phlox, Physostegia, Platycodon, Blue Salvia, Sweet-william, etc.

BULBS: Tall bearded or German Iris, Madonna Lilies.

LAWNS: The first half of August is dead line for hulled Bermuda Grass. Too late for unhulled Bermuda.

VEGETABLE SEEDS: For the Fall garden: Rutabagas, Turnips, Beets, Carrots, Collards, Aragon Spinach, Rape, Kale, Swiss Chard, Radishes.

VEGETABLE TUBERS: Irish Potatoes.

VEGETABLE PLANTS: Cabbages and Collards. Tomatoes for green pickles.

SEPTEMBER

FLOWER SEEDS: Perennials and biennials must be planted now.

BULBS: Iris, Madonna Lilies, Daffodils and Peonies.

LAWNS: Rye Grass on the Bermuda lawn. Evergreen mixtures, Kentucky Bluegrass, Poa trivialis, Redtop, etc.

VEGETABLE SEEDS: Plant hardy vegetables, mostly root and green crops. See August.

VEGETABLE ROOTS AND TUBERS: Onion sets of several kinds: Eschallottes, Multipliers, Potato, Silver Skin and Yellow Danvers.

VEGETABLE PLANTS: Cabbage and Collards.

OCTOBER

FLOWERING PLANTS: Transplant and divide perennials and biennials.

BULBS: For flowering in the house, plant Freesias, Hyacinths, Paperwhite Narcissus, Chinese Sacred Lilies and Lily-of-the-valley. Out of doors: All Dutch bulbs, Crocus, Daffodils, Tulips, Hyacinths, Dutch Iris, German Iris, and Peonies. Dead line for Madonna Lilies.

LAWNS: Rye Grass on the Bermuda lawn. Best Fall month for evergreen mixtures, Kentucky Blue Grass, etc.

VEGETABLE SEEDS: Turnips, Mustard, Rape, Aragon Spinach, Winter Radishes, Kale.

SMALL FRUIT PLANTS: Strawberries.

NOVEMBER

FLOWER SEEDS: Plant hardy annuals, such as Snapdragons, Arctotis, Calendulas, Coreopsis, Candytuft, Clarkia, Cornflowers, Cynoglossum, Strawflowers, Larkspur, California Poppies, Shirley Poppies, Carnation-flowered Poppies, Stocks, etc.

FLOWERING PLANTS: Dead line to transplant and divide perennials and biennials.

BULBS: In the house: Lily-of-the-valley, Hyacinth, Paperwhite Narcissus, Chinese Sacred Lilies, Freesias. Out of doors: Dutch bulbs, Japanese Lilies, Grape-hyacinths, Ranunculus and Anemones, Crocus, Daffodils, Tulips, Hyacinths, German Iris and Peonies.

SHRUBS: Plant flowering shrubs, broadleaf evergreens, conifers and shade trees.

ROSES: May be planted after the 15th.

LAWNS: Rye Grass on Bermuda lawns. Evergreen Mixtures, Kentucky Bluegrass, etc.

FRUITS AND BERRIES: Best month for Peaches, Apples, Pears, Plums, Apricots, Pecan, Figs, Persimmons, Blackberries, Dewberries, Raspberries, Loganberries and Strawberries.

Remember: Peach tree borers may be killed this month by the use of Paradi-chlorobenzene.

DECEMBER

FLOWER SEEDS: Hardy annuals, such as Snapdragons, Arctotis, Calendula, Coreopsis, Candytuft, Clarkia, Cornflowers, Cynoglossum, Strawflowers, Larkspur, California Poppies, Shirley Poppies, Carnation-flowered Poppies, Stocks.

BULBS: Japanese Lilies, Lily-of-the-valley (do not use prepared ones for out-of-door planting; American grown are best in the South), Dutch bulbs, also bulbs mentioned in November.

In the house: Narcissus, prepared Lily-of-the-valley, Hyacinths, Freesias.

SHRUBS: Flowering shrubs, broadleaf evergreens, conifers, shade trees.

ROSES: Early December best period of year for planting Roses.

VEGETABLE SEEDS: Cabbage, Lettuce and Onion in the coldframe.

VEGETABLE ROOTS AND TUBERS: Asparagus and Horseradish.

FRUITS AND BERRIES: Peaches, Apples, Pears, Plums, Apricots, Pecan, Figs, Persimmons, Blackberries, Dewberries, Raspberries, Loganberries and Strawberries.

LOWER SOUTH

That portion of the South lying south of the section we have called the Central South and composed mostly of the Gulf Coast, northern and central Florida, we shall refer to as the Lower South. For planting reasons, we are excepting tropical or southern Florida, that portion south of the frost limit.

JANUARY

FLOWER SEEDS: Alyssum, Blue-eyed African-daisy, Chinese Forget-me-not, Orange African-daisy, Phlox drummundi, Pinks.

FLOWERING PLANTS: Transplant perennials and biennials.

BULBS: Gladiolus, Cannas, Caladiums.

SHRUBS: All flowering shrubs, broadleaf evergreens, conifers, shade trees.

ROSES: Plant in January.

VEGETABLE SEEDS: Brussels Sprouts, Cabbage, Chinese Cabbage, Cauliflower, Collards, Celery, Carrots, Leek, Lettuce, Mustard, Onions, Rape, Radishes, Turnips. Take a chance on Corn and Watermelons. *Coldframe:* Peppers, Tomatoes and Eggplant.

VEGETABLE ROOTS AND TUBERS: Asparagus, Irish Potatoes, Onion sets, Sweet Potatoes in the bed.

FRUITS AND BERRIES: All fruits and berries.

FEBRUARY

FLOWER SEEDS: Alyssum, Asters, Ageratum, Balsam, Celosia, Chinese Forget-me-not, Cosmos, Didiscus, Lobelia, Marigolds, Morning-glory, Nasturtium, Phlox drummondii, Portulaca, Pinks, Strawflower, Sunflower, Torenia, Zinnia.

BULBS: Gladiolus, Canna, Caladiums.

SHRUBS: Broadleaf evergreens, flowering shrubs and conifers. Some varieties of palms may be transplanted now. This should be done just before new root growth commences.

ROSES: Dead line for Roses.

WATER GARDENS: Lilies, Lotus, etc.

VEGETABLE SEEDS: Brussels Sprouts, Beans, Beets, Cabbage, Collards, Sweet Corn, Carrots, Dasheen, English Peas, Lettuce, Leek, Mustard, New Zealand Spinach, Parsley, Radishes, Rutabagas, Romaine, Rape, Squash, Turnips. Take a chance on Cantaloupes, Cucumbers, Watermelons. *Coldframe:* Eggplant, Peppers and Tomatoes.

VEGETABLE PLANTS: Peppers, Tomatoes, Eggplant.

VEGETABLE ROOTS AND TUBERS: Onion sets, Irish Potatoes.

FRUITS AND BERRIES: Dead line for transplanting fruits and berries.

MARCH

FLOWER SEEDS: Alyssum, Asters, Ageratum, Balsam, Blue Laceflower, Celosia, Cynoglossum, annual Chrysanthemum, Cosmos, Cypressvine, Globe-amaranth, Lobelia, Morning-glory, Marigold, Nasturtium, Portulaca, Strawflower, Sunflower, Torenia, Zinnia.

BULBS: Gladiolus, Cannas, Caladiums.

SHRUBS: Dead line for broadleaf evergreens, conifers and flowering shrubs. Transplant palms just before new growth commences.

WATER GARDENS: Waterlilies and other water plants.

VEGETABLE SEEDS: Brussels Sprouts, Beans, Beets, Cantaloupes, Cucumber, Collards, Carrots, Eggplant, Kale, Kohlrabi, Leeks, Mustard, Parsnips, Parsley, Rutabagas, Romaine, Radishes, New Zealand Spinach, Squash, Sweet Corn, Tomatoes, Turnips, Watermelons. Take a chance on Lima Beans.

VEGETABLE PLANTS: Eggplants, Tomatoes, Peppers.

VEGETABLE ROOTS: Onion sets. Dead line for Irish Potatoes.

APRIL

FLOWER SEEDS: Alyssum, Aster, Ageratum, Balsam, Cosmos, Celosia, Didiscus, Globe-amaranth, Marigold, Morning-glory, Portulaca, Strawflower, Sunflower, Torenia, Zinnia.

SHRUBS: Transplant some varieties of palms in April, just before new root growth commences.

LAWNS: Bermuda and Carpet Grass from seed or cuttings; St. Augustine and Centipede Grass from cuttings.

WATER GARDENS: Lilies, Lotus, etc.

VEGETABLE SEEDS: Collards, Dasheen, Cantaloupes, Kohlrabi, Lima Beans, Mustard, Okra, Parsnips, Radishes, Sweet Potatoes, Squash, Wax Beans. Dead line for Corn and Radishes.

VEGETABLE PLANTS: Eggplant.

VEGETABLE ROOTS AND TUBERS: Onion sets.

MAY

FLOWER SEEDS: Alyssum, Cypressvine, Klondyke Cosmos, Marigolds, Portulaca, Torenia, Zinnias.

SHRUBS: Some varieties of palms just before root growth commences.

LAWNS: Bermuda and Carpet Grass from seed or cuttings; St. Augustine and Centipede Grass from cuttings.

VEGETABLE SEEDS: Cantaloupe, Collards, Lima Beans, Okra, Pumpkins, Squash. Dead line for Eggplant.

VEGETABLE PLANTS: Sweet Potatoes, Peppers.

JUNE

FLOWER SEEDS: Alyssum, Klondyke Cosmos, Portulaca, Zinnia.

LAWNS: Bermuda and Carpet Grass from seed or cuttings; St. Augustine and Centipede Grass from cuttings.

VEGETABLE SEEDS: Pumpkins, Sweet Potatoes, Squash. *Seedbed:* Cauliflower, Celery.

JULY

FLOWER SEEDS: Alyssum, Portulaca, Zinnia.

BULBS: Nerines sarniensis, Lycoris aurca.

LAWNS: Dead Line: Bermuda and Carpet Grass from seed or cuttings and St. Augustine and Centipede Grass from cuttings.

VEGETABLE SEEDS: Parsley, Pumpkins, Sweet Potatoes, Squash, Tomatoes. *Seedbed:* Cauliflower, Celery, Eggplant, Peppers.

AUGUST

FLOWER SEEDS: Babysbreath, Blue-eyed African Daisy, Calendula, Candytuft, Annual Carnation, Cynoglossum, Cornflower, Lupine, Nicotiana, Orange African-daisy, Pyrethrum, Pansy, Petunia, Phlox, Pinks, Statice, Verbena, Zinnias.

BULBS: Dahlias (having been held in storage for Fall blooming).

VEGETABLE SEEDS: Cauliflower, Collards, Kohlrabi, Mustard, Squash. *Seedbed:* Peppers, Celery, Eggplant.

VEGETABLE ROOTS: Onion sets.

VEGETABLE PLANTS: Strawberries.

SEPTEMBER

FLOWER SEEDS: Alyssum, Babysbreath, Blanketflower, Blue-eyed African-daisy, Painted-tongue, Pansy, Petunia, Scabiosa, Scarlet Flax, Snapdragon, Statice, Stocks, Verbena.

Take a chance on Sweet Peas.

BULBS: Narcissus (Paperwhite), Leucojum, Amaryllis, Brodiaea, Freesia, Daffodil, Gladiolus (having been held in storage).

LAWNS: Rye Grass.

VEGETABLE SEEDS: Brussel Sprouts, Bermuda Onions, Cabbage, Cucumbers, Collards, Kale, Leek, Lettuce, Mustard, Parsnips, Pepper, Rutabaga, Squash, Spinach, Snap Beans. Turnips. Take a chance on English Peas and Radishes. *Coldframe:* Celery.

VEGETABLE ROOTS: Irish Potatoes, Onion sets.

VEGETABLE PLANTS: Cauliflower, Celery, Pepper, Eggplants.

SMALL FRUITS: Strawberries.

OCTOBER

FLOWER SEED: Alyssum, Babysbreath, Blanket-flower, Blue-eyed African Daisy, Calendula, California Poppy, Coreopsis, Annual Candytuft, Annual Carnation, Cynoglossum, Clarkia, Cornflower, Godetia, Larkspur, Lobelia, Lupine, Mignonette, Nicotiana, Orange African-daisy, Painted-tongue, Pansy, Petunia, Phlox, Pinks, Scabiosa, Scarlet Flax, Snapdragon, Statice, Stocks, Sweet Peas, Verbena.

BULBS: Paperwhite Narcissus, Leucojum, Amaryllis, Brodiaea, Freesia, Daffodils, Gladiolus (having been held in storage).

LAWNS: Rye Grass.

VEGETABLE SEEDS: Brussels Sprouts, Beets, Bermuda Onions, Cabbage, Carrots, Cucumbers, Collards, Kale, Leek, Lettuce, Mustard, English Peas, Parsnips, Peppers, Radishes, Rutabaga, Rape, Spinach.

VEGETABLE ROOTS: Onion sets.

VEGETABLE PLANTS: Celery, Cauliflower, Peppers.

SMALL FRUITS: Strawberries.

NOVEMBER

FLOWER SEEDS: Alyssum, Babysbreath, Blue-eyed African-daisy, California Poppy, Coreopsis, Annual Candytuft, Annual Carnation, Cynoglossum, Clarkia,

Gaillardia, Gilia, Godetia, Hunnemannia, Larkspur, Lobelia, Lupine, Mignonette, Nicotiana, Orange African-daisy, Painted-tongue, Pansy, Petunia, Phlox, Annual Poppies, Scabiosa, Scarlet Flax, Snapdragon, Statice, Stocks, Verbena. Dead line for Sweet Peas.

LAWNS: Rye Grass.

VEGETABLE SEEDS: Brussels Sprouts, Beets, Bermuda Onions, Collards, Broccoli, Carrots, Cabbage, Kale, Leek, Lettuce, Mustard, Parsnips, Parsley, English Peas, Rutabagas, Rape, Spinach, Turnips.

VEGETABLE ROOTS: Onion sets, Irish Potatoes.

VEGETABLE PLANTS: Celery, Cauliflower.

SMALL FRUITS: Strawberries.

DECEMBER

FLOWER SEEDS: Alyssum, Babysbreath, Blue-eyed African-daisy, California Pop-

py, Coreopsis, Candytuft, Annual Carnation, Gaillardia, Gilia, Godetia, Hunnemannia, Larkspur, Lupine, Annual Poppies, Scabiosa, Snapdragons, Statice, Stocks, Verbena.

BULBS: Amaryllis, Alocasia, Alpina, Crinum, Eucharis, Xanthosoma.

SHRUBS: Plant all broadleaf evergreens, conifers, flowering shrubs and shade trees.

LAWNS: Rye Grass.

VEGETABLE SEEDS: Bermuda Onion, Brussels Sprouts, Broccoli, Carrots, Cabbage, Collards, Kale, Leek, Lettuce, English Peas, Parsley, Rape, Turnips.

VEGETABLE ROOTS: Irish Potatoes, Asparagus.

VEGETABLE PLANTS: Celery.

FRUITS AND BERRIES: Plant all fruits and berries.

NOTE—The absence of perennial seeds for planting in the Lower South is very noticeable in this planting calendar. Generally in this area, with the possible exception of the northern edge, perennials are unsatisfactory, as they seldom last through the hot Summer. Achillea, English Daisy, Shasta Daisy, Feverfew, Dianthus, Gaillardia, Gerbera, Gypsophila, Helenium, Helianthus, Lathyrus, Physostegia, Stokesia and Valeriana grow fairly satisfactory. A great many of these must be treated as annuals and sown each Autumn.

PRUNING

Winter pruning should be carried on just before new growth starts in the Spring, the Lower South during January, the Central South during February, the Upper South during March. However, in the case of Roses and Shrubs, the tall stems should be removed during the Fall after the first killing frost.

Summer pruning for Spring flowering shrubs should be carried on in late May.



CALIFORNIA (San Francisco South)

By TOM McMULLEN

The California calendar is prepared for the region extending from San Francisco south with Santa Barbara as the center. Gardeners north of the center region would delay Spring planting operations two weeks, while those in the extreme South and in the hotter interior valleys could move planting dates forward. Fall procedure would be the reverse.

JANUARY

Garden resolutions are in order. Why not resolve this year to plan for continual color. Keep a calendar of plants you want as you see them in bloom.

From now until April plant dormant deciduous ornamental and fruit trees, shrubs, Roses, berry plants, and Grape vines. Don't forget to include flowering fruit trees.

Prepare holes for Citrus and subtropical trees. If ground has a layer of hard pan, better have holes blasted. Home Citrus plantings should be 15 ft. apart; Avocados 18 ft.

Prune Roses, deciduous trees, shrubs and vines. Start hardwood cuttings of these in sand.

Spray dormant trees to control scale and leaf curl.

Spade flower beds for later plantings. Also cultivate around established plantings. This is the only time when deep cultivation doesn't disturb roots.

Good time to plan perennial border.

Keep garden cleaned and leaves raked up. Pests are kept to a minimum if they have no hiding place.

Plant roots of Asparagus and Rhubarb in deeply spaded ground. Sow under glass Cucumbers, Tomatoes, Peppers, Squashes. Sow Bush Beans.

FEBRUARY

One of best months for garden work—Spring activities of sowing and planting.

Sow Salvia farinacea for cutting.

Most perennials may be seeded or transplanted.

Start cuttings of Geraniums, Fuchsias, Carnations, Lilacs, Weigelas in sand; later pot up.

Plant Palms, Dracaenas, Pampasgrass, Redhotpokers for tropical effect.

Leonotis may be planted for July color.

For dry hillsides plant native shrubs.

Time to think about berried shrubs for Autumn color: Cotoneasters, Pyracanthas, Pittosporum rhombifolium, and the native Toyon.

Fertilize Roses with bonemeal.

Remake perennial borders and beds, and include some newcomers.

Start Hollyhocks, Verbenas and Pentstemons for late Summer blooms.

Shrubs may be pruned just as well this month as last.

In southern California make open ground sowings of annuals.

Rose plantings may be continued.

Be sure to chart your varieties; labels may get lost.

Start Gladiolus plantings.

Sow tree and shrub seeds. Soak hard seeds 24 hours.

Plant early Potatoes. Nearly all vegetables may be sown this month and next.

All the deciduous fruits are available now. Include Figs and Persimmons. Train fruit trees espalier against patio walls for space saving.

MARCH

In warmer sections if Dahlias have been undisturbed for several years, dig and store for month.

Continue Gladiolus plantings until June.

Start Tuberous Begonias in pots.

Sow in flats: Marigolds, Verbenas, Salpiglossis, Zinnias. Transplant once before moving to permanent beds. Prepare beds for plants.

Secure plants of Anemone japonica, Michaelmas Daisies, Gaillardias, Heliopsis, Helianthus, Heleniums.

Plant named varieties of Phlox in Bay region; Pentstemons are a substitute in the South.

Prune Poinsettias and cure cuttings for two weeks before planting.

Start cuttings of Chrysanthemums. Pot up about a month later.

Good time to plant tender shrubs.

Dust Roses weekly with sulphur to control mildew. Spray with nicotine or pyrethrum for aphids.

Keep weeds under control.

If hot spell comes watch for wilting of new growth, especially Eugénias, Abelias and Durantas.

Excellent month to start new lawn. Fertilize established lawn with commercial fertilizer. Water well after application. Use poison bait for slugs and snails.

Plant Summer Sweet Peas. Provide supports.

Plant out Pansies.

Continue sowings of most vegetables.

Plant Pole Beans.

Thin root crops.

Plant out seedlings previously sown under glass.

Watch for eating insects.

Vine and bush fruits may still be planted.

Plant Citrus and Avocados just as soon as danger of frost is over—March to June. Plant thick-skinned Avocados in region of little frost; thin-skinned need little

protection above 25 degrees. Fuerte is best variety for home or commercial use.

In mildest sections try Cherimoyas, Papayas, Passion Fruit, and Sapotas for table variety.

APRIL

Flowers in profusion now.

Dahlia planting from now to June. Plant clumps 6 in. deep with manure in subsoil. Give plants plenty of room. Set stakes with plants. Later mulch plants heavily with well rotted manure.

Plant Cannas and leave undisturbed for several years.

Plant Agapanthus in partial shade.

Plant out Tuberous Begonias.

Sow in open ground Cosmos, Coreopsis, Convolvulus.

Transplant annuals started earlier.

Sow in flats perennial Dianthus and annual Chrysanthemums.

Set out Zinnias and Marigolds.

Plant out potted Fuchsias and Geraniums.

Not too late for Chrysanthemum cuttings. Set out plants already rooted.

Plant Salvias.

Pinch back Carnations.

Good month to separate Waterlilies.

During their growing season Cacti can stand quite a bit of water.

Continue pest control. Watch for snails. Dust for mildew. When spraying for thrips be sure to get underside of leaves.

Water systematically.

Rake, weed and fertilize lawn.

Set out plants of Tomato, Pepper, Eggplant, Globe Artichoke in well worked soil.

Plant an herb garden near the kitchen door.

Spray Citrus for leaf curl.

MAY

The garden should now be filled with color.

Plant potted Chrysanthemums in heavily fertilized bed. Select late blooming varieties. Pompons best for general culture. Give weekly dustings with sulphur.

Plant Dahlia tubers for Fall bloom.

Set out Asters.

Dig up Anemones and Ranunculus when foliage withers. Heel in or store.

As tops of other bulbs die, cut, and plant annuals in vacant spots.

Some biennials and perennials may still be sown.

Cultivate to keep the ground from crusting.

Save lawn clippings to mulch both old and new plantings. Don't turn under till dry.

Prune Winter flowering vines.

Keep Sweet Peas cut and watered to keep blossoms coming.

Pick Pansies regularly.

Sow vegetable seed for succession.

Thin out Beets, Onions and Carrots.

Pinch out shoots of Melons, Cucumbers, etc.

Mulch Avocados; spray for thrips. Feed Citrus four times a year—once with manure and three dressings of sulphate of ammonia if soil is not acid. If acid use nitrate of lime. Check soil character with local Farm Adviser. Sulphate of ammonia applied to Avocados at the rate of one pound per year per tree just before blossoming time will insure fruit setting.

JUNE

Start seed of Wallflowers. Treat as biennial and move to bed in October.

Give plenty of water and fertilizer to Chrysanthemums. Pinch back Mums.

Divide Violets.

Make cuttings of Carnations.

Joints of Cacti and other succulents may be rooted in sand. Expose Cactus cuttings several days to callous to prevent rot. Use fine spray for young seedlings.

Make basins for watering trees and shrubs.

Sow Eucalyptus seeds.

Prune Spring flowering deciduous shrubs whose dead blossoms mar the plants.

It is possible to get two and even three bloomings of Delphinium by cutting back and watering.

Dust with sulphur.

Keep hedges clipped.

Kill the ants which protect aphids and mealy bugs. Use a syrup poison.

A circular (No. 29) on control of pocket gophers and moles may be obtained free by sending to University of California Printing Office, Berkeley.

Cultivate growing crops and provide supports for Beans.

JULY

Start in cloth covered frame seeds of Anemones and Ranunculus to be transplanted to flowering spot in Fall.

Freesias may be started now from seed.

Sow seed of Gerbera jamesoni and certain biennials, such as Canterbury-bells and Foxgloves.

Save Delphinium and other perennial seed and sow immediately.

Pinch back Chrysanthemums.

Rest Roses during July and August by withholding water.

Divide and replant Bearded Irises.

Keep after weeds.

Continue maintenance work.

Systematic watering is now most important.

Cosmos, Marigolds and other late blooms must be kept in good growing condition.

Use liquid manure on vegetables.

Lemons are pruned now.

All Citrus are pruned just after fruit is picked.

AUGUST

Stake larger Chrysanthemums; dust with sulphur. Spray for aphids. Give liquid manure to Mums till buds open.

Sow seed of *Scabiosa caucasica*. When transplanting them give bed a lime dressing.

Give Roses a second light pruning.

Start planting Freesias.

Separate and reset *Amaryllis* bulbs.

Keep *Dahlia* blossoms cut.

Iris may still be transplanted and new plantings started.

Biennials and some perennials may be started now.

Prepare Sweet Pea trench for later sowing.

Fall Flower Shows will be coming. Go to them for new ideas.

In the hot interior sections have a lathhouse where certain shade-lovers flourish.

The fish pool should have light shade.

Sow Cauliflower, Cabbage and Spinach.

Plant second crop of Potatoes and Peas.

Sow Celery seed and in hot sections shade till plants are established.

Spray Citrus trees every few months.

SEPTEMBER

Plant Daffodils, Narcissus, Scillas, Muscari and Crocuses.

Plant Cape bulbs until November in light, sandy soil with plenty of sun.

Freesias, *Ixias*, *Sparaxis*, *Watsonias*, *Montbretias* and dwarf early *Gladiolus*.

Try *Ornithogalum umbellatum* and *Cyclamen*.

Sow California wild flower seed with first Fall rain.

Plant Dutch, Spanish and Japanese Irises. Iris seed may also be planted.

Plant Lilies as soon as available. When established do not disturb until they get crowded.

Sow for early bloom (where they are to flower) Candytuft, *Centaureas*, *Nasturtiums*, annual *Phlox*, *Scabiosa* and *Schizanthus*. For Summer bloom sow in March.

In milder sections start in flats Snapdragons, Stocks, *Cinerarias*, Wallflowers, Pansies and *Primula malacoides*.

Sow Winter Sweet Peas for Christmas bloom.

Sow perennials in frames or boxes shaded with burlap.

Plant tree seeds.

Prune Roses lightly, cultivate and start watering. Spade and leave rough, beds for future planting.

After the first rains get out the hose and water natives even more.

Plant vegetable seed for succession. Set out plants from earlier sowings.

Sow early Cabbage.

OCTOBER

A good planting month.

Plant Tulips; late varieties most important.

Keep planting Cape and Dutch bulbs.

Plant Anemones and *Ranunculus*.

Plant out Snapdragons, Stocks and other seedlings now ready.

Plant in well drained, sandy soil *Gerberas* for cutting.

Sow in open ground *Calendulas*, *Clarkias*, California Poppies, Linums, *Godetias*, Larkspurs, Lupines, Pansies, *Petunias*, *Ageratums*, Sweet Alyssum and other hardy annuals.

For borders plant *Lobelias* and *Primula malacoides*.

For the rock garden plant *Aubretias*, *Bellis perennis*, *Campanulas*, *Convolvulus mauritanicus*, dwarf *Dianthus*, *Mesembryanthemums* and the *Thymes*.

Divide old *Delphinium*, *Geum*, Oriental Poppy, *Phlox* and *Montbretia* clumps, and reset.

For early color plant *Acacias*, *Cassias*, *Genistas* and *Chorizema ilicifolium*.

In San Francisco Bay region plant *Azaleas* and *Rhododendrons*.

Plant *Fuchsias* all along the Coast; this is one of our best Summer shrubs.

Santa Barbara south plant *Lantana*, *Streptosolen jamesoni* and *Grevillea thelemanniana*.

Plant *Ericas* in sandy peat.

Plant *Camellias* in acid soil.

October best time to renovate lawn and best Fall month for seeding new one. Install sprinkling system if you can possibly afford it. Give lawn a dressing of fertilizer. Go after weeds which come with the first rains. In hoeing be careful of *Narcissus* and other bulbs which may be near surface.

Begin pruning of deciduous shrubs and trees.

Keep Roses and Mums fed.

Continue Sweet Pea sowings.

Sow Radishes, Onions, Peas and other vegetables.

NOVEMBER

Chrysanthemum and Thanksgiving time.

Garden alterations are in order.

Continue Tulip planting and seed sowing.

Cut back *Buddleias* severely.

Lift Tuberous *Begonias*, *Gladiolus* and *Dahlias*.

Plant conifers throughout the Winter months; or transplant. Planting of balled or potted broadleaf evergreens may be continued to May. Hardy evergreens such as Laurels may be moved.

Transplant any perennials started earlier from seed.

Roses which are brought into bloom at this time hold their color longer.

Spading and fertilizing are in order.

Renovate lawn.

Transplanting season for deciduous trees and shrubs.

Plant native shrubs such as *Ceanothus*, *Carpenteria*, *Prunus*, *Fremontia* and *Rhus*. Plant native and other Lilies.

Sow Broccoli, Cabbage, Cauliflower, Kale, Kohlrabi, Peas, Lettuce, Onion,

Parsley and other hardy vegetables. Keep after leaf-chewing insects with arsenate of lead.

DECEMBER

Buy *Cedrus deodara* or *Pinus halepensis* for living Christmas tree. Plant out after holidays.

Plant *Eucalyptus* for windbreak or wood 4 to 8 ft. part.

Best time to prune deciduous trees and shrubs. Some pruning of broadleaf evergreens may be done now but do not prune any which will bloom in Spring.

Vines and climbers may be thinned and pruned. Same rule applies.

Erica melanthera may be cut for bouquet sprays and *Cotoneaster* and *Pyracantha* branches for indoor decoration.

When cutting *Poinsettias* for house decoration burn the ends or dip in boiling water as soon as cut.

Dig late *Dahlias* and store. Order your deciduous plants.

Spade in well rotted manure for most shrubs.

Pines, Junipers, *Ericas*, *Grevilleas* and *Acacias* want bonemeal. Active manure burns them.

Dig manure into unoccupied vegetable beds for future use.

Winter Sweet Peas need fertilizing every two weeks.

Bring indoors certain *Cereus* and other tender Cacti if there is danger of frost. Your patio will be much gayer if you have some potted plants in appropriate places.

Plant Loquats and Guavas. Both fruits make excellent jelly.

Time to be thinking of plans for the new year that the garden may never have a dull day.



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(Arranged for instant information)

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In this Index to Contents no attempt has been made to index all the species and varietal names mentioned in this book, except when these have special paragraphs given to them; otherwise, for instance, in the chapter on Annuals and Biennials, will be found listed all the more worthy varieties; in the chapter on Ferns, all the best Ferns; in the chapter on Pruning is given a full list of nearly every plant which calls for pruning treatment, and so on throughout all the chapters. Every species or family is treated in its own particular chapter; hence, it was deemed unwise to string out a list of hundreds of names which might serve to confuse.

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